IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication JULY 13, 1961

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How to Improve It
Why Some Efforts Fail

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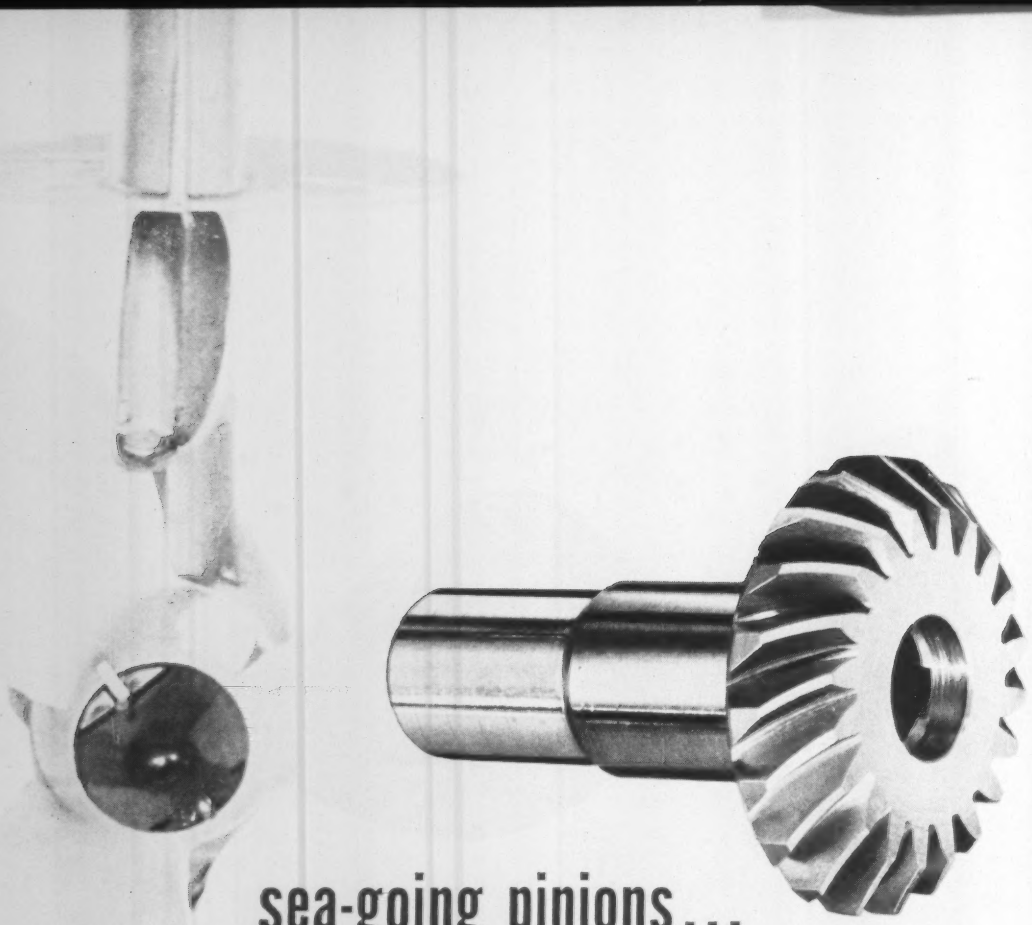

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*Manufacturers of Johnson, Evinrude and Gale Outboard Motors.

ARISTOLOY STEELS

DIVISION OF
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ARISTOLOY STEEL DIVISION 4001 Mahoning Ave., Warren, Ohio • EXPORT: Copperweld Steel International Co., 225 Broadway, New York 7, N. Y.

KNOW YOUR ALLOY STEELS . . .

This is one of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many who may find it useful to review fundamentals from time to time.

Steel *for Strength . . . Economy . . . Versatility*

Flame-Hardening Alloy Steels

The process known as flame-hardening involves the direct application of flame to the surface of steel, heating it above the transformation range, then hardening it by quenching. The primary purpose of this process is to achieve surface-hardness without affecting core properties. Jets of flame are played directly on the steel, and hardness penetration can be made to vary considerably. In alloy steels this depth will range usually from 0.03 to 0.12 in., the actual figure depending upon the method of heating and quenching used.

Unlike carburizing, flame-hardening does not involve the absorption of extraneous elements by the steel. There is no alteration of the chemical composition. To put it simply, the steel must have its own self-hardening characteristics; it cannot be dependent upon carbonaceous salt baths, gases, and other media.

Flame-hardening is not a substitute for the conventional furnace method. Each has its uses. The particular virtue of flame-hardening is that the flames can be directed to localized areas. The furnace, on the other hand, is generally more economical and feasible when parts produced in large quantities must be hardened all over.

Any type of hardenable steel, alloy or carbon, can be flame-hardened, and there will usually be no scale or pitting. The alloy content is the governing factor when determining the quench. In some cases a rapid quench is required; in others, it can be as slow as air-cooling. Tempering presents no problems, for flame-hardened steel can be tempered as if hardened to the same degree by other methods.

A list of typical flame-hardened parts includes such familiar items as gear and sprocket teeth, and certain types of cams and rollers, and shoe treads. A complete list would include many other parts that often require a localized hardening treatment, especially for wear-resistance.

When you need information about flame-hardening methods, please feel free to consult with our technical staff. Bethlehem metallurgists will work with you, at no obligation, and you can depend on their suggestions. You can rely on Bethlehem, too, as a source of alloy steels . . . for Bethlehem makes the complete range of AISI standard grades, as well as special-analysis steels, and all carbon grades.

This series of alloy steel advertisements is now available as a compact booklet, "Quick Facts about Alloy Steels." If you would like a free copy, please address your request to Publications Department, Bethlehem Steel Company, Bethlehem, Pa.

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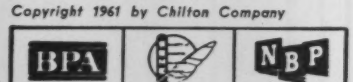

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Special This Week

How to Increase Worker Productivity

Many approaches to increase worker productivity miss the target. Appeals to reason and increased benefits, for example, seldom arouse worker response. Progress in productivity starts with this realization. In the first of a three-part series, author-consultants Dr. R. N. McMurry and J. F. Sullivan show why programs fail. p. 67

PRODUCTIVITY

Where It Starts

How to Improve It

Why Some Efforts Fail

Controls Could Curb '62 Production

Production should soar to a new all-time record high by May or June of 1962. Two factors could block this—government controls based on limited war, or controls based on limited mobilization. It depends on Berlin. Late fall of this year holds the key. p. 57

Missile Parts Demand Reliable Tests

When a rocket chamber fails, a million-dollar space shot ends up as a twisted flaming mass. Trying to find out why normal test results varied from inspector to inspector, one company opened a door to completely-reliable nondestructive test methods. p. 87

Next Week

Auto Labor: Is a Strike Coming?

Preliminaries in auto labor talks are still going on in Detroit. The big question is whether settlement will be reached before the August 31 deadline. Next week's Special Report analyzes union and management tactics and the issues that must be resolved.

Tom Gilbert shifts gears 675 times a day and likes it. Operating a new Warner & Swasey No. 5 Turret Lathe, Tom dials the proper speed on the Preselector, then flicks the lever and gets an instant automatic shift. He gives his employer, John N. Martin, Manufacturer, 50% higher output than possible on older turret lathes in the shop. The **Warner & Swasey** Company, Cleveland.

Foreign Aid: What to Do About It?

Last week one of our readers "discovered" that we were "against" foreign aid. We are—the way it is being handled. And we are not sure but what it all ought to be cut out until we find out what we are doing. But being a practical cuss, we guess that can't happen.

Certainly after seeing abroad a road planned to cost $5 million that finally cost $25 million, and with few cars to run over it, we got to thinking. And after reading about Congress' investigation, we wondered. Then perusing many books by those who put it down in black and white, we knew something was haywire.

We were talking to a high-level Democratic Congressman the other day. He decried some of the sorry messes we have gotten into, but he did call the waste a "detail." He added though, "I did not say a small detail." His point was pretty much the popular idea: We have to spend for foreign aid no matter how bad it smells.

Our critical reader said that foreign aid is needed just as badly as the Community Chest needs great help from the rich. Now we are sure that the rich—and the not-so-rich who also support the Community Chest—would have something to say if things went awry in the Chest.

If all Chest officials branched out with Cadillacs, there might be fewer donations. If people who were supposed to get help from the Chest continued to be ill-clothed and in trouble, there would be an investigation—and a falloff in contributions.

Our critic also said we were irresponsive, that people like us were the very ones Mr. Kennedy was talking about when he mentioned those who were hurting the foreign aid program. That may be. But Congress isn't so pleased at the way JFK alone wants the complete handle of the foreign aid spigot. Nor is it pleased with some rathole aspects of the expenditures.

We would settle for a completely hard-headed attitude on foreign aid. Certainly there is no merit in saying it is sacred, or that we have to toss the dough around because maybe some of it will serve our purpose. It isn't money we are scattering around the world. It is the work and earned value of our citizens.

It seems fair to ask that if our representatives in Washington—and our President—insist on a mammoth foreign aid program, it should be run straight. If we have to have it, let's make sure the money goes for something of value.

Tom Campbell

Editor-in-Chief

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Keep an Eye on Berlin

The soft price and easy supply situation in industry could, and may, change overnight. Reasons: The greatly under rated seriousness of the Berlin crisis, and the swelling product demand due to business recovery.

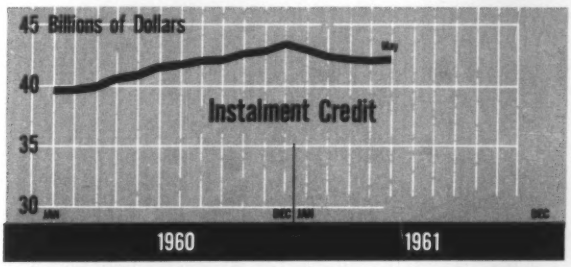
And that's why some in the Administration are already more than just mulling over controls.

Realization by industry of a defense buildup for a limited war may come later in the year—when recovery is in full motion. This could spring a flood of inventory buying. Examples: Steel, aluminum, scrap.

One steel official is saying privately that the industry may hit 100 pct sometime in the first half next year. This would be due to buyer's fears of price jumps, labor stoppages, and mobilization.

Instalment Credit Inches Up

Consumer instalment credit outstanding rose to slightly over $42 billion in May, up $27 million over



April. Personal loans led the advance in debt. Auto loans fell off $50 million from the previous month on a seasonally adjusted basis. For the first five months of the year, instalment credit has shown a $375 million decline. Two months were up, two months were down.

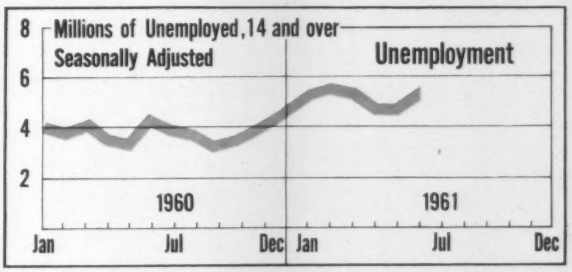
The spotty showing of instalment credit reflects attitudes of cautious consumers. Personal income and savings are high, but credit lags. Consumers are keeping their finances liquid. For example, an exceptionally large percentage of auto buyers are paying cash.

Consumers are poised for a buying spree but the borrowing and spending won't come in the summer.

Teenagers Swell Jobless Ranks

The number of employed and the number of jobless both rose in June over May. A record 68.7 million persons were employed as of mid-June. But at the same time, 800,000 more were looking for work than in the previous month.

The swelling of both the workforce and the unemployed was largely due to the summer swarm of



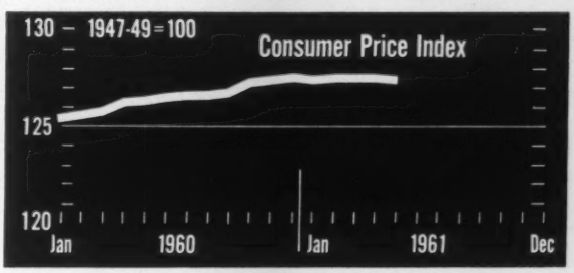
teenagers onto the job market. An estimated 2.5 million youths joined the labor force in June, and 900,000 of these were not able to find work.

With adjustments for seasonal factors, the overall employment showing is not all gray. Some 6.8 pct of the work force was unemployed in June, down one-tenth of one percent from May. And long-term unemployment (15 weeks or more) dropped slightly in June.

Price Index: Steady but Potent

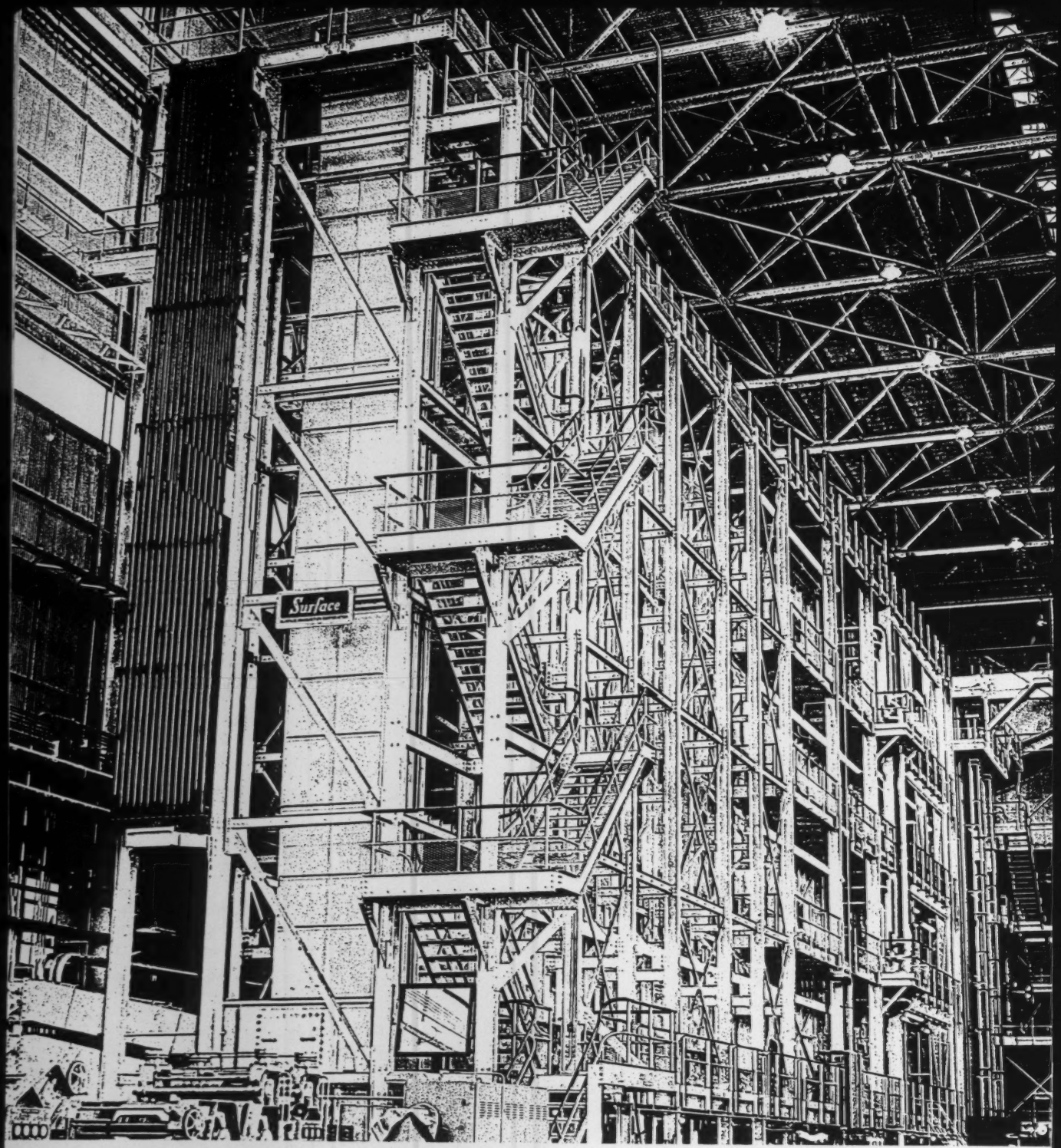
The cost of living has not varied by over one-tenth of one percent for 7 straight months. In May, the Consumer Price Index dipped to 127.4, down from 127.5 in April.

Static as the price index is, it still commands hard looks from those who like to call the turns in business. The weather eyes are watching the index



for first signs of inflation. It rates the attention. The wages of over 300,000 workers, many in metalworking, are tied to the index through escalator pay clauses.

The summer letdown, however, should keep a lid on, or at least moderate, prices for the time being. There is not enough "demand" pressure yet at the retail level to set any price spirals in motion.



Courtesy Columbia-Geneva Steel Division, United States Steel Corporation

Sign of performance better than specified: The modern tin plate industry demands highest quality at lowest operating cost—requirements which can be met only with continuous annealing, a process pioneered by Surface. This Surface installation produces 96,000 lbs/hr of .010" strip at speeds up to 1500 fpm. Address inquiries to 2402 Dorr Street, Toledo, Ohio.

SURFACE

SURFACE COMBUSTION, Toledo 1, Ohio/ a division of Midland-Ross Corporation MR

Seniority Goes With Plant Shift

A new obstacle has been placed in the way of companies which want to move plants from one area to another. A Federal judge in Detroit has ruled that a company must offer jobs at the new location to present employees.

Gemmer Manufacturing Co., a division of Ross Gear & Tool Co., planned to move its Detroit operations to a new plant at Lebanon, Tenn. It had refused to offer transfer rights to Detroit workers because of an agreement with Lebanon officials. The community floated a $2.4 million bond to build Gemmer a new plant—provided the company hire only Lebanon area workers.

Judge Fred W. Kaess ruled that the employees' rights to seniority cannot be "unilaterally denied" without their consent. He also ruled that these seniority rights continue past the company's contract with UAW Local 80. The contract expires Oct. 1, the company hoped to have the transfer completed by Sept. 2.

The judge ruled that the workers' vested rights apply to a "plant" regardless of its physical location. The rights include seniority for rehiring purposes.

However, the union may lose its right to represent the workers in the new plant. In the opening paragraph of the contract the union is recognized only in a plant or plants within the city limits of Detroit.

Jobless Benefits Costs Climb

Jobless benefits will cost industry over $3 billion in state and Federal taxes this year, says Unemployment Benefit Advisors, Inc. The state tax rate is up 10 pct, says UBA. The Federal tax is up from 0.3 pct to 0.4 pct and goes to 0.8 pct in 1962. Only seven states are expected to have reduced rates this year, the agency says.

Steel Employment Picks Up

Through May, steel employment had picked up 8.6 pct from the January level and appeared headed for an improved rate into the summer.

American Iron & Steel Institute figures show 518,641 salaried and hourly workers employed in May. This compares with 501,323 in April and is 41,098 higher than the January average.

By comparison, the average employment during the second half of 1960 was 521,500. In the first half of 1960, when steel operations were booming along through most of the period, employment averaged 621,000.

Meanwhile, the Dept. of Labor released results of a survey stating steel industry employment increased only 2 pct during the February-April period.

The government report also stated the industry would add about 25,500 more workers to August.

"The bulk of the employment pickup was expected in the North Central region (Illinois, Ohio, Indiana) and the Northeast," the report states.

Teamsters: Hoffa In Control

Teamster president James R. Hoffa strengthened his already impregnable position in his own union and in the national labor front. This is the principal, although predictable, result of the national Teamster convention.

In constitutional changes, the voice of the rank-and-file was shut out of future Teamster conventions. With local officers and business agents automatic delegates, it appears impossible for any dissident group to gain a foothold.

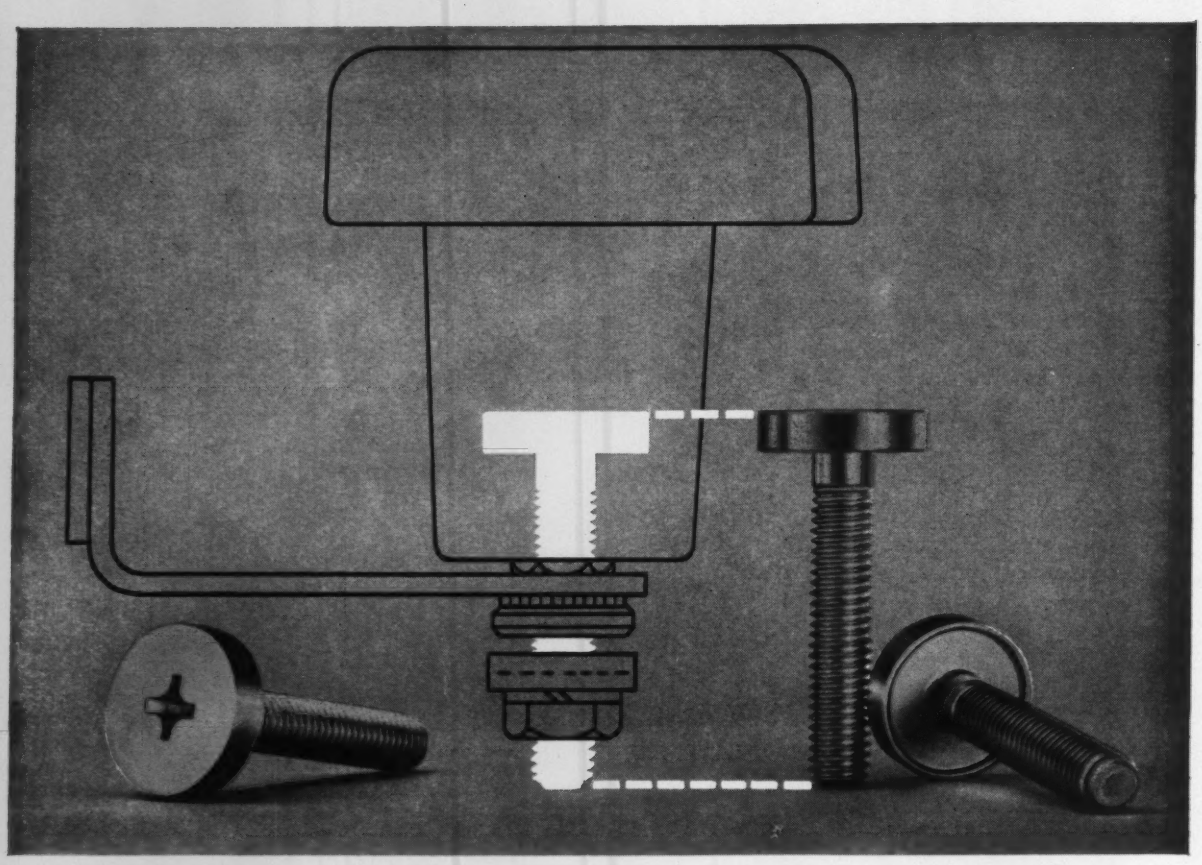
And an attempt to subject Mr. Hoffa's re-election to a union referendum was shut out without a chance. So the new five-year term, at an increased $75,000 annual salary (unlimited expense account) was assured.

Probably more important than internal union business is the intent to extend Teamster organization scope. The union's jurisdiction to organize was officially extended to all workers in all fields.

This will be made easier by a new measure to give officials of adopted unions full rights to Teamster pensions. This is obvious bait for other unions to come into the Teamsters without injury, and probably with some gain, for union leaders.

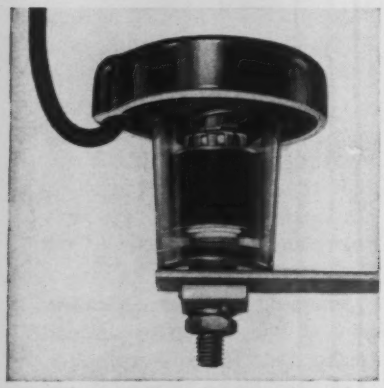
To further strengthen the militant Teamster's position, the convention at Miami Beach authorized movement of Teamster headquarters. It will probably be re-located in Detroit, the Hoffa home town.

Summing up: The centralization of the Teamsters around stocky Mr. Hoffa is complete. And it is likely to remain unchallenged while Mr. Hoffa is active in the union.



CUNISIL, new Anaconda copper-nickel-silicon alloy, gives you high strength for tough electrical jobs

THE PROBLEM: The studs for Line Materials Secondary Class Lightning Arresters (illustration above and below left) call for an unusual combination of properties. They must have high physical strength for structural reasons and to handle the stresses of high surge currents. Yet they must also have relatively high electrical conductivity. And for economical fabrication, the alloy must have good cold-forming characteristics and be readily machinable.



LINE MATERIALS Type S-3 Secondary Class Arrester with stud of Cunisil, copper-nickel-silicon alloy. Cunisil is also used for lower studs of Line Materials Protective Gaps.

THE SOLUTION: Continental Screw Company, which makes the studs for Line Material Industries, found the answer in Cunisil-837, Anaconda's versatile new high-strength, heat-treatable alloy with these valuable properties in the precipitation-hardened condition:

Tensile strength—psi min.	90,000
Yield strength—at .50% extension under load, psi min.	70,000
Elongation in 4 x D, min.	8%
Machinability, (Free Cutting Brass=100)	40
Electrical Conductivity, % IACS, as heat treated	30 to 42

In addition, Cunisil-837 has corrosion resistance comparable to copper and Everdur® copper-silicon alloys—and is easy to work cold before heat treatment.

METALLURGICAL COMMENT. Most of the nickel and silicon in heat-treated Cunisil is present as an intermetallic compound, nickel silicide, and it is the precipitation of nickel silicide in the form of particles of submicroscopic size by a relatively low temperature heat treatment that accounts largely for the distinctive properties of the alloy.

Prior to the hardening heat treatment, the alloy is brought to a proper condition for hardening with a solution anneal at a much higher temperature and then a water quench from this temperature; at this stage the alloy is quite soft and in a condition for drastic cold-working operations. The hardening heat treatment consists of heating at a controlled temperature for a definite length of time to obtain the desired mechanical properties.

For more information—see your Anaconda American Brass representative, or write: Anaconda American Brass Co., Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 6149

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Anaconda American Brass Company

★ How U. S. Views Steel Prices

No matter what is the outcome of the President's economic advisers study of steel prices, the steel industry will be asked not to increase prices.

If the study being made by the Council of Economic Advisers indicates costs do not justify an increase, the industry will be warned a price hike would be frowned upon as not in the public interest.

If the study shows costs have increased substantially, the industry will be asked to make a "sacrifice" for the nation and forego a price increase.

The only other course the Administration would take would be to drop the whole matter. And this would be done only if the steel industry abandoned any attempts to increase prices.

The "sacrifice" plea, reminiscent of the President's inaugural address, would put steel executives on the spot. It is the type of moral suasion the President seems ready to use in all cases concerning one of his pet projects—the maintenance of price stability.

The Council's conclusions will be ready in a "couple of weeks," staff economists say. The study covers steel prices in relation to labor costs, capital costs, materials costs, and the profit cycle of the industry.

When the conclusions are ready they will be passed on to Council Chairman Walter Heller. From Mr. Heller they will undoubtedly go to the President. What happens then seems to be up to the steel industry. The President is not likely to act unless a price increase seems imminent.

■ Social Security Taxes Will Go Up in '62

A liberalized social security bill raising taxes on workers and employers has been signed into law by President Kennedy.

Heavier pay check reductions and employer contributions will begin next year. Social security taxes on workers and employers will be increased by up to $6 a year each. Self-employed persons who pay a 50 pct higher rate will pay up to $9 a year more.

■ Has Business Council Destroyed Its Value?

The Business Advisory Council, a group of 175 corporate executives, may have defeated its purpose when it moved to free itself of government controls. Of course, the BAC may have done it on purpose.

Indications from government sources are that the BAC's severing of ties with the U. S. Commerce Dept. only served to render it ineffective. The sources say the Commerce Dept.'s top brass feel it can do without the BAC.

On the other hand, some believe the Council would rather be ineffective than ride under the tight reins of Commerce Secretary Luther Hodges.

Still another viewpoint comes from Congressman John Moss (D., Cal.), who says the BAC should be disbanded if it insists on being independent of the government.

The BAC move reverses all the restraints Sec'y Hodges forced on it early this year. He made himself general chairman of the group, tied it closer to his department, and made it hold public meetings. The Council now is offering its services to all government agencies. There is some doubt, however, that the agencies will accept the offer.

The reorganization of the BAC as an entirely private organization was announced by Council Chairman Roger Blough, chairman of the board of U. S. Steel Corp., at a meeting with President Kennedy.

■ Commerce Develops Patent Right Rules

The final solution of the patent problem — who should get patent rights, government or industry— may be solved by the U. S. Department of Commerce. (See IA, June 15, p. 73.)

The Commerce Dept. is formulating recommendations for Congress dealing with patent rights to inventions developed by private industry working under government contracts. The basis for the recommendations came from a meeting of government and industry representatives in Washington.

Commerce Secretary Luther Hodges hopes to come up with recommendations that will "encourage industry to work on government research projects, protect legitimate private incentives, and at the same time safeguard the public interest."

■ Antitrust File Hunt Studied by Congress

Legislation to give the Justice Dept. power to inspect records of companies it suspects of antitrust violations is moving through Congress.

The bill, allowing record inspection in non-criminal antitrust cases only, has been approved by the Senate Antitrust Subcommittee. It now awaits action by the full Senate.

WHY RISK LOSS OF GEAR SHAPER PERFORMANCE?

Give your products all the high-production, high precision advantages of Fellows Gear Shaper performance by tooling up with Fellows cutters.

The better design of Fellows cutters is the result of advanced engineering techniques, including the use of a high-speed computer for solving design and application problems. Their better quality is the result of constant advances in metallurgy and manufacturing methods. And, proof of their better performance are the thousands of Fellows cutters in use on modern gear production lines.

Fellows cutters on Fellows machines lower costs and speed production on external and internal, spur and helical involute gears and a wide variety of non-involute shapes as well. All Fellows Offices are at your service for providing information.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont, U.S.A.
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THE PRECISION LINE **Fellows** *Gear Production Equipment*

Do Steel Imports Pose a Threat?

The United States-Japan Trade Council says U. S. steelmakers have little to fear from imports "so long as they remain technologically progressive and competitive-minded in price policies."

In a publication entitled "The Truth About Imports—Part II" the Council discusses claims by the steel industry for relief from import competition.

Says the booklet: "Neither the American steel industry generally, nor the steel workers union has advocated increased protection from imports. But some companies in the industry have sought relief."

The Council notes that steel imports rose from 1.5 pct of the total U. S. supply in 1957 to 6.1 pct in 1959. But it dropped to 4.7 pct in 1960. The rise between 1957 and 1959, says the Council, resulted from the 1959 steel strike and from high price policies that "inevitably opened the door to competition from abroad, even from countries where basic costs are higher."

U. S. to Watch Canadian Imports

"In order to achieve higher volumes, manufacturers who have never tried export should examine this avenue: Take a shot at the United States market—it may not bring you much net profit, if any, but it can absorb a lot of overhead."

This was the recent statement of H. George De Young, president, Atlas Steels, Ltd., and chairman of the Canadian Productivity Council, to students at the Univ. of Western Ontario.

It followed a statement made in a speech by George Hees, minister of trade and commerce: "Businesses that are now well established in the export market . . . have told me that their first venture was on the basis of selling an extra 25 pct of production on the export market at cost or, if necessary, even lower."

The result of these statements was a letter and a copy of Mr. Hees' speech from the U. S. Embassy to Washington. The commercial attache of the Embassy notes: "We're going to keep an eye on this thing—and that's the understatement of the week."

Latin American Trade Improves

The United States trade position with Latin America is improving. But it's more a case of a slackening decline than major gains.

While trade with Western Europe and Japan soared for the U. S. last year (IA—July 6, p. 13), trade with Latin America dipped again in 1960. But the rate of decline has eased.

According to the Bureau of Foreign Commerce, U. S. exports to the 20 American Republics fell about one pct to $3.6 billion last year. Imports from Latin America in 1960 dropped 2 pct to $3.5 billion.

Of course one of the major causes for the still-weak trade program with Latin America is the reduced shipments to Cuba.

Of particular interest is the fact that metal and industrial material imports failed to dip last year. In fact, total imports of Latin American metals and manufactures climbed slightly. They totaled 15 pct of the 1960 U. S. metal imports.

Volta Backing

All parties involved in Ghana's Volta River dam project, including a combine of U. S. aluminum companies, will probably give final approval to the giant development plan within the next month.

Contracts will be signed for financing of the $168 million hydroelectric project and the $178 million aluminum smelter plant.

President Kennedy last week promised Ghana's President Kwame Nkrumah that the U. S. would back the Volta project.

Canadian Tax Relief

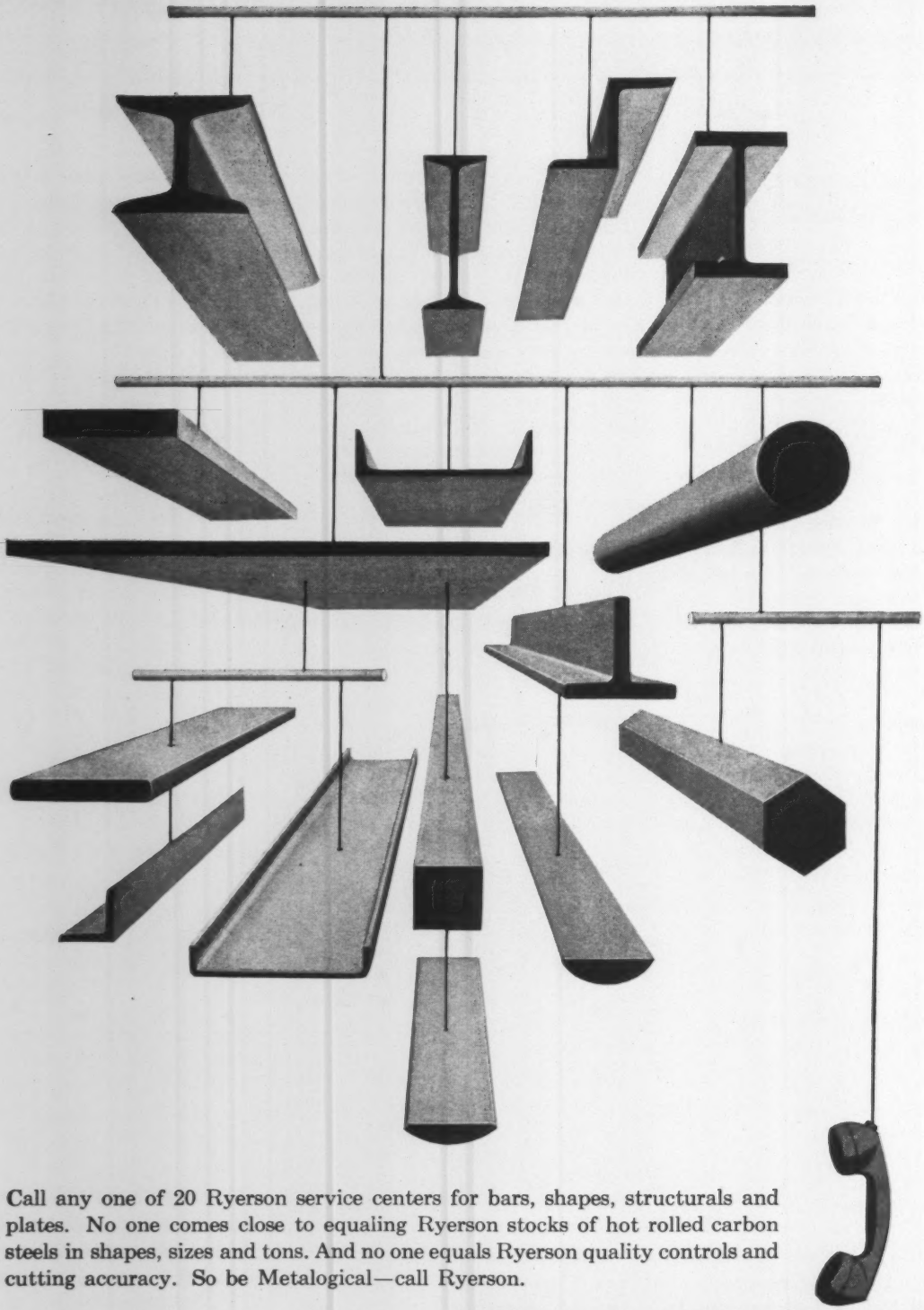
The recent tax plan of Canadian Finance Minister Donald Fleming brings relief to many Canadian industries. Among those to benefit will be metal fabricating companies.

Under the new plan, metal fabricators can charge the expenses of looking for minerals in Canada in the same way as mining and petroleum companies can deduct the costs of exploring and drilling.

Public Information

Commerce Dept. is making public the commodity, value, and destination of export licenses granted to U. S. companies.

The names of the exporting firms and the purchasers, however, will remain secret. The first list, made public last week, contained 458 licenses. Of these, 22 were for exports to Communist countries.



Call any one of 20 Ryerson service centers for bars, shapes, structurals and plates. No one comes close to equaling Ryerson stocks of hot rolled carbon steels in shapes, sizes and tons. And no one equals Ryerson quality controls and cutting accuracy. So be Metalogical—call Ryerson.

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JOSEPH T. RYERSON & SON, INC., MEMBER OF THE INLAND STEEL FAMILY

METALOGICS

PLUS VALUES IN STEEL • ALUMINUM • PLASTICS • MACHINERY

Plastic Seals Castings

Foundries are taking a close look at plastic impregnants. Results appear very promising. For instance, one new plastic composition converts to a 100 pct infusible-solid seal, without solvents. Automotive manufacturers will use it for both aluminum and magnesium castings.

Honeycomb Welding

Metal-honeycomb production is now routine, according to Hexcel Products Inc. A new diffusion-welding process turns out an entire block of honeycomb at one time. This is done before the blocks expands. Core weights are reduced as much as 50 pct. However, strength properties and thermal stability equal those of present cores.

Old Cannons Never Die

Where do old army howitzers go when they die? In one case at least, the answer is Lockheed's Palo Alto research laboratory. Its barrel

PRESSURE CHAMBER: Puts on the squeeze.

is missing, but the cannon's five-foot breech and firing chamber serve as a pressure chamber. Here, submarine instruments get to know pressures as great as 12 tons per sq in. These instruments will operate six miles down in the ocean's depths. They're slated for sub use.

Team Effort Pays Off

Industrial teamwork sparked the development of a new handling concept for ramming and gunning mixes. The idea evolved during a "meeting of minds" between a refractory producer and a container concern. This team effort led to a better way of shipping and placing these mixes. As a result, furnace construction and repair costs tumble. Key to the savings is a new shipping container with an unusual dumping device. This new container permits an easier, lower-cost method of handling mixes in openhearth steel furnaces.

Insulates at 2500°F

A rigid-ceramic dielectric keeps its electrical stability at temperatures up to 2500°F. This new material adheres to complex assemblies. It also remains stable at continuous heats far above those possible with plastic-type foams. Future uses include electrical and thermal insulation.

Typical Properties

Density	35-45 lb per cu ft
Flexural Strength at 77°F	520-780 psi
Compressive Strength at 77°F	1100-1500 psi
Thermal Conductivity	0.31 Btu per hour per °F

Nuclear Power Pack

High-shielding and heat-exchanger costs block widespread use of nuclear power. But a major fuel breakthrough promises to alter this bleak picture. Coating tiny nuclear-fuel particles with pyrolitic graphite drastically cuts radiation hazards. This impervious jacket imprisons fission byproducts. Also, the pyrolitic graphite doesn't react with most coolants. These properties may add up to direct-steam-power generation.

Computer Circuits Shrink

When RCA deposits thin cadmium-sulfide films on an insulating base, the result is a very tiny transistor. It's so small that 20,000 units fit on a postage stamp. These newcomers shrink basic computer circuitry to the size of a book page. Commenting on the development, Dr. James Hillier, Vice President of RCA Labs, states: "Electronics research has long sought a way to make transistors cheaply in large arrays. The thin-film technique offers the first practical solution."

NOW . . . A ONE-COAT FINISH FOR EXTERIOR ELECTRICAL CLOSURES

Cut paint/bake time in half with new SUPER NUBELITE® thermosetting acrylic finish

June 27, 1961—The Glidden Company announces a new one-coat finish for electrical enclosures with the weather-resisting properties of traditional two-coat systems.

This newest in the family of Glidden one-coat SUPER NUBELITE finishes has just passed the stringent tests of a leading independent testing institution and is approved for suitable exterior electrical applications.

The battery of tests included salt spray, ultra-violet light and water, moist carbon dioxide-sulphur dioxide and moist hydrogen sulphide—all proving the durability of SUPER NUBELITE.

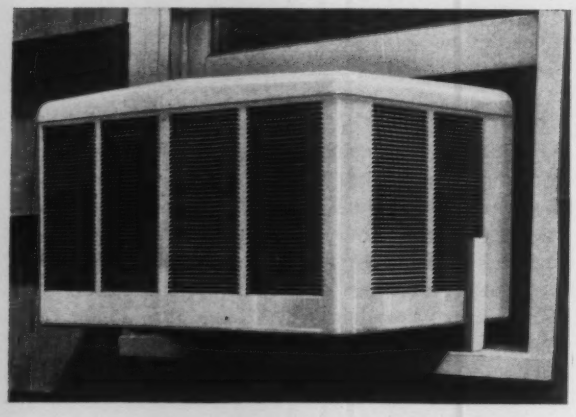
SUPER NUBELITE is applied in a film thickness of 1.5 mils and can attain theoretical coverage of 700 square feet per gallon per mil.

Other one-coat SUPER NUBELITE finishes are already in production on refrigerators, freezers and fluorescent light fixtures. Two-coat SUPER NUBELITE is now being used on clothes washers, dryers and other electrical appliances.

For complete information on one-coat SUPER NUBELITE finishes, call your Glidden representative or write direct.

Key to approval by leading independent testing institution was salt spray test. Above panel, coated with one-coat SUPER NUBELITE shows creepage of less than 1/16 inch along scribes after 2208 hours exposure.

Air conditioners and other exterior electrical enclosures can be finished with SUPER NUBELITE for superior weather protection at one-coat economy.



QUALITY Glidden PRODUCTS

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INDUSTRIAL PAINT DIVISION

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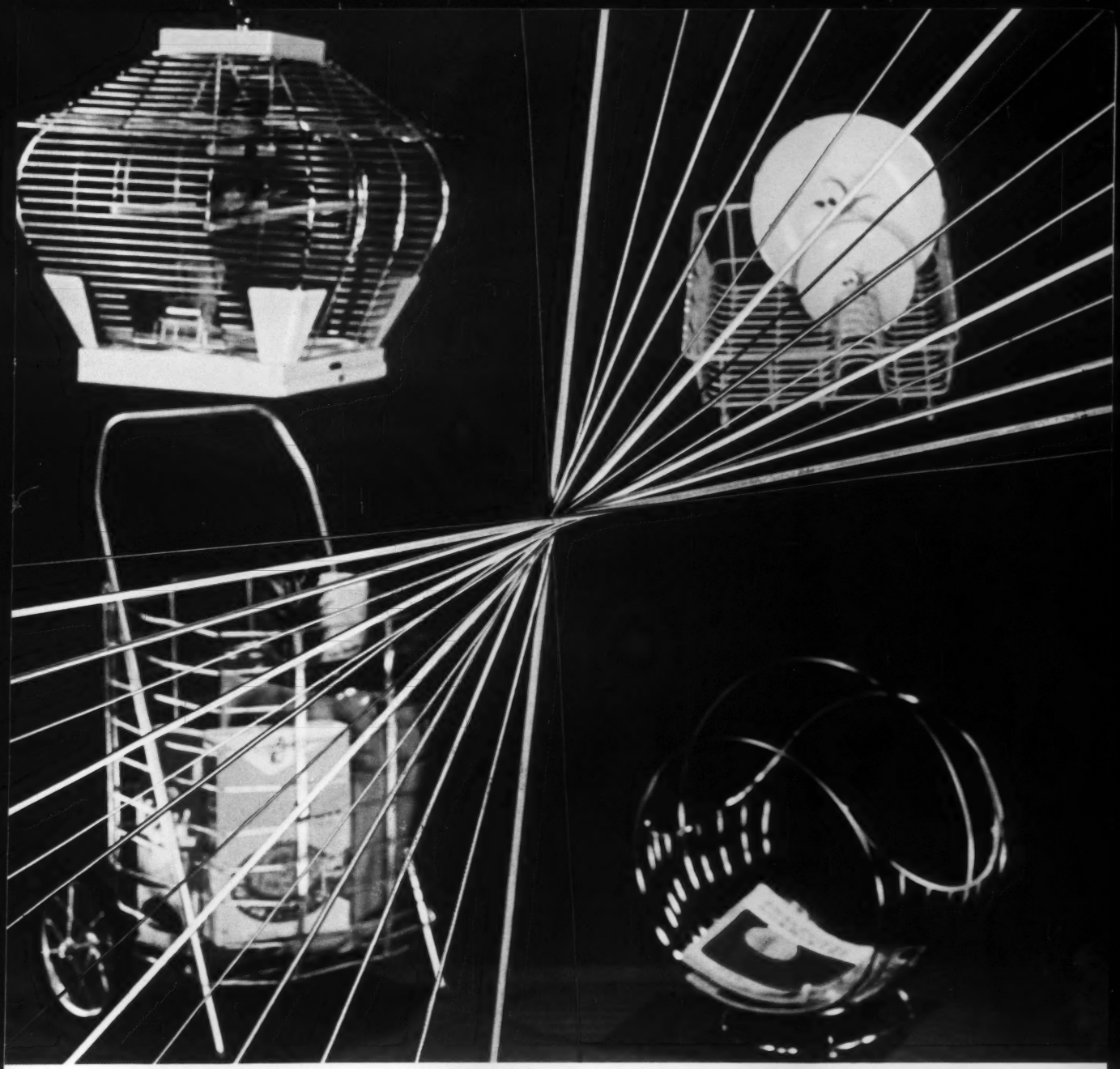
Cleveland 14, Ohio



Need steel wire?

Bethlehem makes nearly all kinds.

QUALITIES
Industrial, cold-heading and cold-rolling, chain, stapling, ball, "scrapless" nut, upholstery spring, welding, and many others.

TREATMENTS
Annealed, lead-annealed, patented, and various special treatments to meet specific requirements.

ANALYSES
Low-, medium-, and high-carbon; many alloy grades.

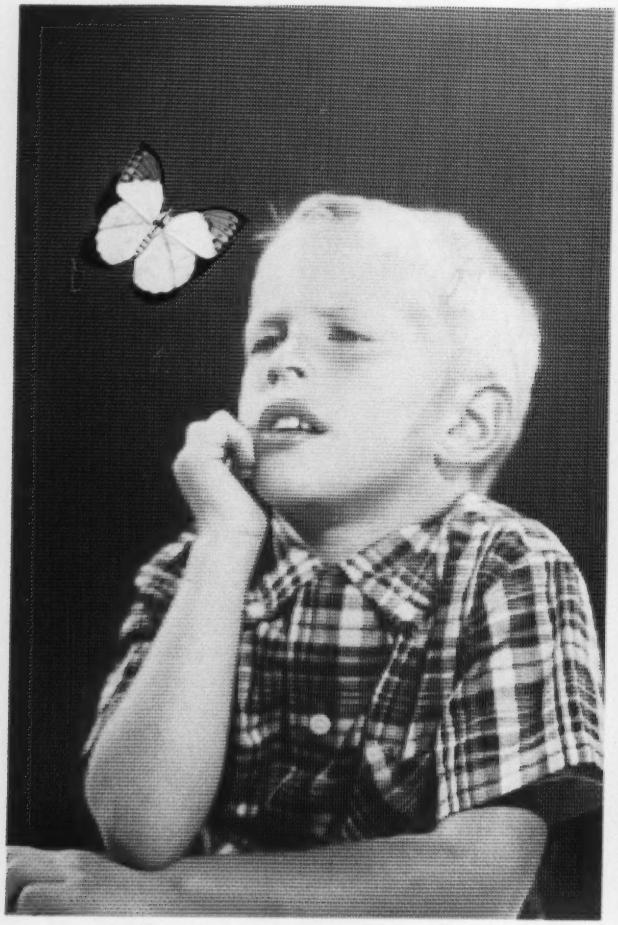
FINISHES
Bright, galvanized, Bethanized (electrolytically zinc-coated), Bethalume (aluminum-coated), limed, and many special finishes

Steel
for Strength
. . . Economy
. . . Versatility

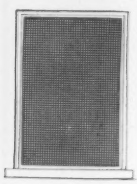
BETHLEHEM STEEL

BETHLEHEM STEEL

Weld it... weave it...



We furnished this manufacturer just what he wanted for the special wrench being welded here—wire that is strong, easy to shape, and has a clean finish that produces a sound weld . . . *the first time.*



Using the steel grade recommended by our metallurgical engineers, this customer has been turning out top-quality wire screening for many years. The efficient operation of the wire in swift-working, automatic looms is a result of the freedom from defects which is "built into" the steel.

Whatever you do with steel wire

Steel

for Strength
. . . Economy
. . . Versatility

Bethlehem supplies steel wire for all of the various manufacturing processes from cold-heading to coiling. Our metallurgists are always available to help select the correct type of wire for your job. And they can often give you practical advice that helps to trim your production and handling costs.

form it... coil it... twist it!

Laundry and shopping carts must take rough handling, as well as resist corrosion. This wire former has found that the wire we recommended forms easily, and helps them turn out a laundry cart that is light, easy to handle, and durable.

Bethlehem designs an upholstery spring wire specifically for coil springs that hold through years of active family use. For years we have supplied leading spring-makers. These innersprings are coiled from Bethlehem Silver Star Spring Wire for a quality line of mattresses and upholstered products.

In the handy household brush Bethlehem wire is brought to the housewife's doorstep. We supply this brush-maker with an electrolytically zinc-coated steel wire which is twisted into brush handles. Bethlehem's easy-forming, bethanized wire takes this severe twisting, holds the bristles, and gives long service.

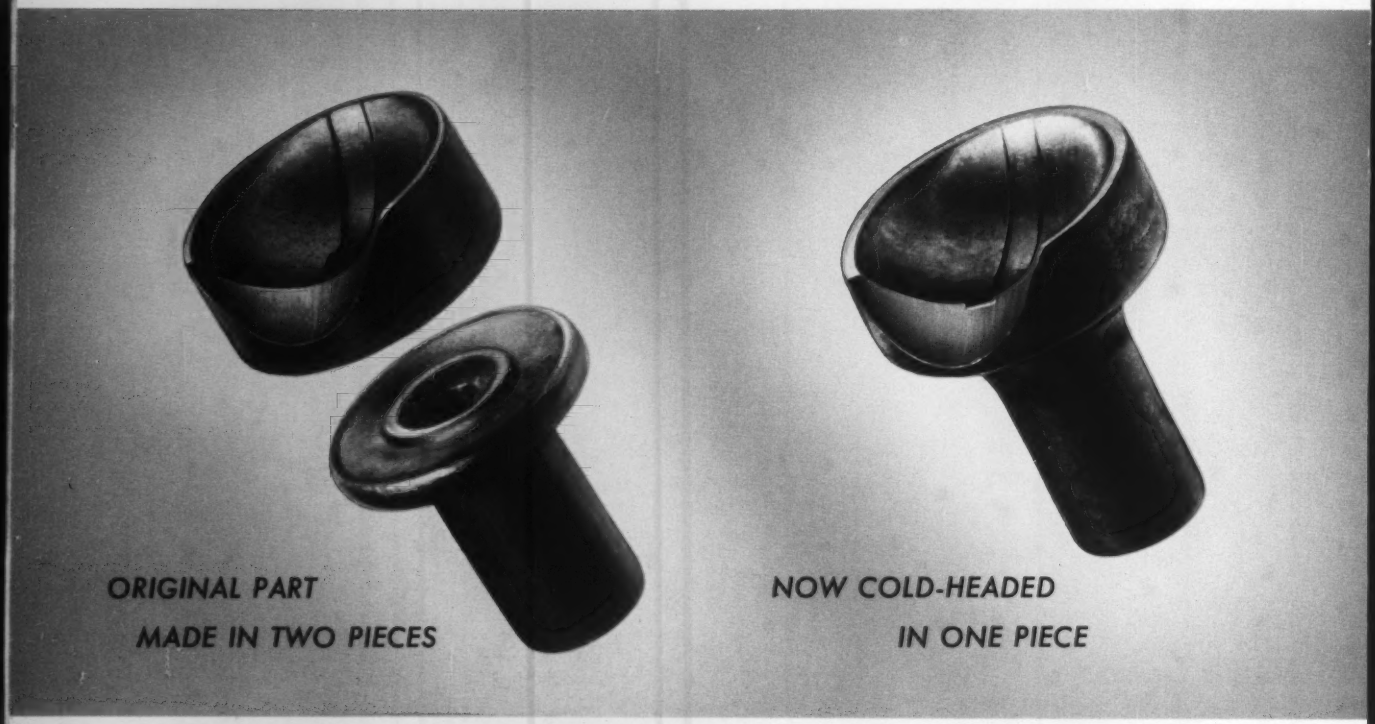
...Bethlehem can supply it

BETHLEHEM STEEL

BETHLEHEM STEEL

cold-head it...

When you're going to cold-head a product, the wire has to be just the right grade. A special type of Bethlehem cold-heading wire was developed by Bethlehem's metallurgists for this component of an automotive steering-rod relay system. The two-piece part, comprising a stud and a seat, has been replaced by a single part which is now cold-headed at a considerable savings.



Bethlehem supplies steel for virtually every use

Here's a partial list of steels and specialty products in the Bethlehem line:

BARS AND BILLETS:
Carbon and alloy AISI grades
Concrete reinforcing bars
Leaded steels
Special rolled sections

TOOL STEELS:
Water, oil, and air-hardening grades

FORGINGS:
Drop, press, hammer, and upsetter
Rolled-and-forged sections

ROD AND WIRE:
Hot-rolled rods, wire, and wire products

SHEETS:
Hot- and cold-rolled
Continuously galvanized
Enameling sheets

TIN MILL PRODUCTS:
Electrolytic and hot-dip tinplate; blackplate

PLATES:
Universal and sheared
Flanged and dished heads

WIRE ROPE AND SLINGS

FASTENERS:
Bolts, cap screws, rivets
Special fasteners

STEEL PIPE:
Continuous butt-weld
Electric resistance-weld

STRUCTURAL SHAPES

COLD-FORMED SHAPES

PALLET RACKS

WELDMENTS:
Frames, tanks, housings, vessels

FREIGHT CARS, PARTS, WHEELS, AXLES

RAILS:
Tee, crane, girder

CASTINGS:
Carbon, alloy, stainless steel
Iron, brass, bronze

Publications Dept.,
BETHLEHEM STEEL COMPANY
Bethlehem, Pa.

Please send me information on steel wire for use in

.....

Also send me information on.....

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Name.....

Company.....

Address.....

City..... *Zone*..... *State*.....

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

Rule by Fear

▪ The IRON AGE editorial that appeared in the issue of June 22 ("Rule By Fear: We Are Facing It!") continues to bring many letters to the editor. Two of these letters follow:—Ed.

Sir—I have read with much satisfaction your editorial in the June 22 issue. As usual, you have hit the nail on the head. I would to God that others would be as forthright and as discerning.—Charles D. Fagan, president, Sharpsville Steel Fabricators, Inc., Sharpsville, Pa.

Sir—You have not given me enough argument in your June 22 editorial mentioning the Justice Dept. wanting General Electric Co. to charge enough for its products to show a profit. I can hardly believe that it is fair for a diversified company to sell products produced in some of its divisions at a loss to gain business or create a monopoly.

Do you know how many small companies General Electric has put into bankruptcy by this practice?

Have you stopped to realize what would happen if General Electric did gain control of a special products market? I should think that prices would be greatly increased. I take it from your editorial you think controls should not be placed now to nip monopoly in the bud nor be placed later to control a monopoly.—B. A. Newcombe, Arcadia, Fla.

Mercury Question

Sir—If you have a question and answer department, I would like to ask one question. Twice recently I have been asked why mercury is based on a 76 lb flask. We buy and sell small amounts of mercury in connection with Venturi meters. And frankly, I don't know the answer. This is my 47th year in the waterworks business.

If you have anyone who can tell me why mercury is based on 76 lb flasks instead of by the ton or by the pound, I will appreciate finding out. This is a matter of curiosity so that I can answer the questions of a couple of customers. — C. E. Painter, Waterworks Equipment Co., Salt Lake City, Utah.

▪ The reason for this, according to Harry Sharpe, director of the Miscellaneous Metals and Minerals Div., Business and Defense Services Administration, is as follows:

Spain has been one of the world's leading suppliers of mercury for as long as anyone can remember. The original standard was a quintal, which equalled 100 apothecary lb under Spanish standards. A quintal is 76.06 avoirdupois lb.

Under the current Spanish system which started in June, 1927, a flask weighs 76 lb. This is accepted in world mercury circles. From June 1904 until 1927 the standard flask was 75 lb. Before 1904 it was 76.5 lb. But the whole thing stems from 100 apothecary lb and one quintal.—Ed.

Steel Prices

Sir—It would seem from your editorial of June 15 ("Steel Prices: Are They Fish or Fowl?") that the greatest economic sin is a reduction in prices.

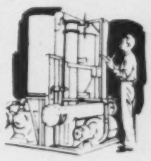
I have long regarded this as a perfectly reasonable device to increase consumption and allow the benefits of efficient production to be passed on to the consumer. Is this really "idiotic" as you claim? Are we forever to be guided by a policy of continual steel price increases . . . even when reductions are in the interest of the industry as well as the nation? — Marvin Moss, Ithaca, N. Y.

DICK ELLIOTT
Hayes Sales Engineer
and General Sales Manager
personally invites you to

"SOLVE YOUR HEAT TREAT PROBLEM IN OUR LAB"

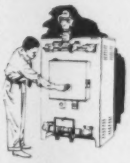
Ever since 1918, C. I. Hayes has maintained a laboratory of the latest *production-line* furnaces and allied equipment (not lab models) on which actual heat treating processes can be duplicated and evaluated. Here you can take an active part in developing the best heat treat procedure for your needs. You participate in developing equipment that's exactly right for your work.

CUSTOMERS ARE WELCOME to make use of the lab without cost or obligation. Hayes equipment *plus* our engineering know-how *plus* the Hayes library of case histories — this combination is ready to help you solve your problems . . . either with standard or special furnaces.



HAYES SHOWED THE WAY— others followed. There are several "Chinese copies" of the Hayes lab in industry today . . . proof positive that the right way to solve heat treat problems is the Hayes way — by experimentation and demonstration — not by "sweet talk".

WANT RESULTS GUARANTEED? Won't you please take advantage of our lab and its range of furnaces and atmosphere generators . . . whether you're hardening low carbon steel, sintering refractory metals, or brazing stainless. Let us show you how to improve your product, reduce costs, and speed production.



BULLETIN 1961 gives full lab details . . . write for your copy today.

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ELECTRIC FURNACES

It pays to see HAYES for metallurgical guidance, lab. facilities, furnaces, atmos. generators, gas and fluid dryers.

Now, the strongest bridges are the fastest to build because they're . . .

GUARDED BY GALVANIZED STEEL

Galvanized steel sheeting—long used for permanent concrete forms in building construction—has now been adapted to do the same job for bridge engineers and with remarkable success.

On bridges and their approaches, a heavier gauge sheet is used with deepened corrugations for added strength. This new form assembly is not only strong enough to support heavy concrete slabs, but installation takes only half the time required by other types of form work.

The strength and excellent corrosion resistance of galvanized steel is also winning increasing acceptance in a wide variety of architectural uses as well as in other areas of highway construction, such as culverts and guard rails.

WEIRKOTE® IN PARTICULAR is one galvanized steel that's especially well suited to all these applications. Made by the modern continuous process, it can be worked to the very limits of its steel base without losing even a chip of its zinc protection. Weirkote is made by two National Steel divisions: Weirton Steel and Midwest Steel. For further details, write to Weirton Steel Company, Weirton, West Virginia.

MIDWEST STEEL
Portage, Indiana

WEIRTON STEEL
Weirton, West Virginia

Divisions of
NATIONAL STEEL CORPORATION

FATIGUE CRACKS

More From McMurry

No IRON AGE article ever brought a greater request for reprints than the three-part series by Dr. Robert N. McMurry on the problem employee.

More than 4300 reprints of this IRON AGE special report have been mailed out since the articles appeared in August, 1959. Another McMurry article on developing front-line supervisors (Feb. 5, '59) also attracted great reader response.

Productivity Analyzed — That's why we're pleased to present, beginning on p. 67 of this issue, Dr. McMurry's latest article, "Productivity: Where It Starts, How to Improve It, Why Some Efforts Fail."

This provocative series for management enlarges and extends Dr. McMurry's important (and sometimes controversial) ideas on employee direction.

Dr. McMurry, president of the McMurry Corp., Chicago, is a highly-regarded industrial psychologist. He is joined in this present article series by a co-author, John F. Sullivan.

Unique Record—Mr. Sullivan is a member of the McMurry Co. He is also a practicing labor relations consultant with a unique record. He has never lost a National Labor Relations Board representation or decertification election in the 23 years he has been at this work.

Dr. McMurry credits Mr. Sullivan with many of the ideas on labor management that appear in the series starting in this issue. Based on Mr. Sullivan's long experience and remarkable record on hard-core labor relations problems before the NLRB, it can be seen that these ideas are practical and workable ones.

Mental Exercise

Many of our readers enjoy the monthly feature "You Arbitrate It." These are actual cases culled from the files of the American Arbitration Assn. which the reader has a chance to arbitrate. (You'll find the latest in this issue on p. 82.)

A group of these features has now been reprinted from The IRON AGE by the Association. They appear in an attractive, four-page pamphlet, giving the problem and the final decision in each case.

If you would like a copy, you can obtain one by writing the American Arbitration Association, 477 Madison Ave., New York 22, N. Y.

For Sale: Locomotive

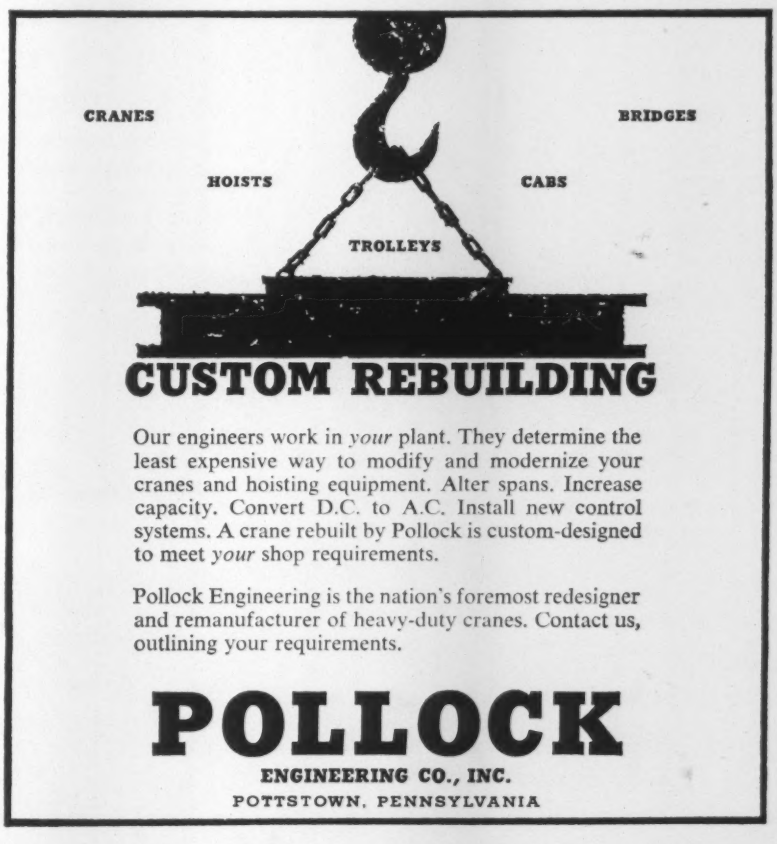
Do you need a locomotive? If so, the Galva Iron & Metal Co., 115 S. W. Sixth Ave., Galva, Ill., has one for sale.

Hand-built by a retired druggist, it includes a miniature steam locomotive, passenger car, and 500 ft of track. The asking price: $5000, delivered and unloaded within a 500-mile radius of Galva.

Specifications include: Locomotive 10 ft in length, weighting 1500 lbs. Boiler capacity is 20 gallons of water with the tender the same. It's tested for steam of 150 lbs and can be operated on wood, charcoal, coke, or coal. All boiler materials meet ASME specifications.

Track is 7½-in. gage and made of hard aluminum alloy, patterned after regular 130-lb rail.

"Sorry it took so long to get the boss' signature, he's on vacation."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Our engineers work in *your* plant. They determine the least expensive way to modify and modernize your cranes and hoisting equipment. Alter spans. Increase capacity. Convert D.C. to A.C. Install new control systems. A crane rebuilt by Pollock is custom-designed to meet *your* shop requirements.
Pollock Engineering is the nation's foremost redesigner and remanufacturer of heavy-duty cranes. Contact us, outlining your requirements.
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POTTSTOWN, PENNSYLVANIA

EXPERIENCE—Alertness to individual operating requirements, coupled with a broad knowledge of rolling practices, is a major part of every Blaw-Knox Roll Engineer's experience.

Behind him is an organization with more than a century's experience in the development and manufacture of rolls.

This experience is your assurance of rolls having the properties, dimensions, and finish for maximum service.

Blaw-Knox Roll Engineers welcome the opportunity to join with you in selecting and applying the rolls best suited to your operating conditions.

Blaw-Knox Company, Foundry and Mill Machinery Division, 300 Sixth Avenue, Pittsburgh 22, Pennsylvania.

BLAW-KNOX

ROLLS

COMING EXHIBITS

Western Plant Maintenance & Engineering Show—July 18-20, Pan Pacific Auditorium, Los Angeles. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

National Chemical Show—Sept. 5-8, International Amphitheatre, Chicago. (Chicago Section, American Chemical Society, 86 E. Randolph St., Chicago 1.)

Industrial Building Exposition—Sept. 25-28, New York Coliseum.

MEETINGS

JULY

Cast Iron Pipe Research Assn.—Annual meeting, July 26-27, Seaview Country Club, Absecon, N. J. Assn. headquarters, Prudential Plaza, Suite 3400, Chicago.

AUGUST

American Astronautical Society—Fourth western regional meeting, August 1-3, Sheraton-Palace Hotel, San Francisco.

Personnel Management Conference—Cornell University's New York State School of Industrial and Labor Relations, August 1-4, Ithaca, New York.

Metallurgical Society of AIME—Semiconductors conference, Aug. 30-Sept. 1, Ambassador Hotel, Los Angeles. Society headquarters, 29 W. 39th St., New York.

SEPTEMBER

Air Moving and Conditioning Assn., Inc.—Annual meeting, Sept. 10-14, The Greenbrier, White Sulphur Springs, W. Va. Assn. headquarters, Guardian Bldg., Detroit.

International Industrial Conference — Sept. 11-15, Masonic Memorial Auditorium, San Francisco.

(Continued on P. 28)

IMPERIAL D-C MOTORS

for Dependable Heavy-Duty Service

Imperial D-c Motors meet the ever-increasing demand for dependable, heavy-duty drives in nearly every industry today. Over seventy years of d-c design and application experience is behind the manufacture of these motors. Ratings from 1 through 125 hp., for constant or adjustable speeds with shunt, series or compound windings are available in all standard enclosures. When you choose *The Imperial Line* you are assured of motors that stay on the job longer... keeping production high at lower costs. Write for bulletin or contact the sales office nearest you.

IMPERIAL

ELECTRIC COMPANY

84 Ira Ave. • Akron 9, Ohio

Semi-Guarded D-C Motor

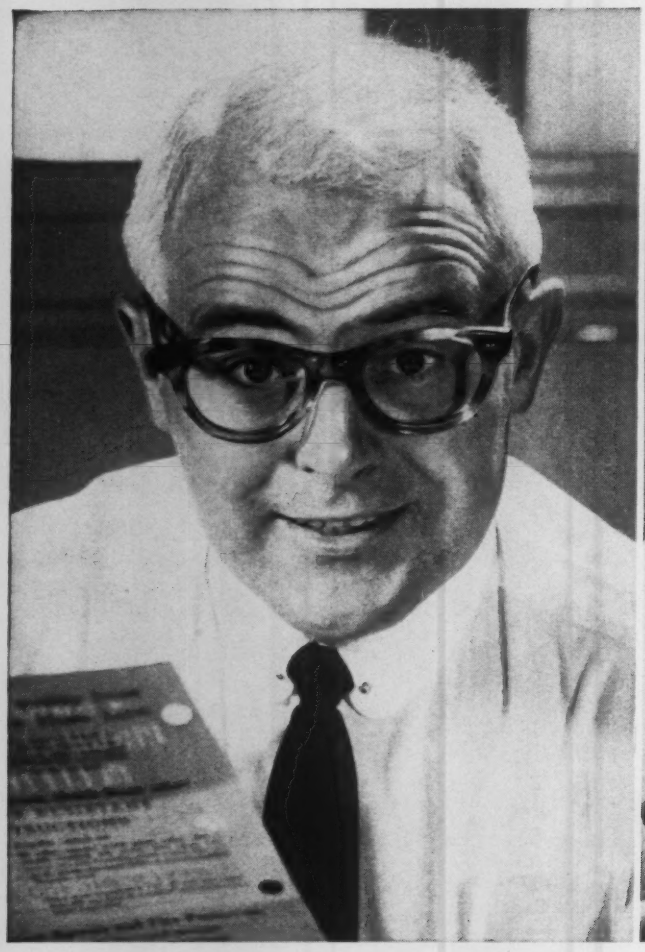
Drip-Proof D-C Generator, SAE Flange Mounting

Totally-Enclosed Fan-Cooled D-C Motor

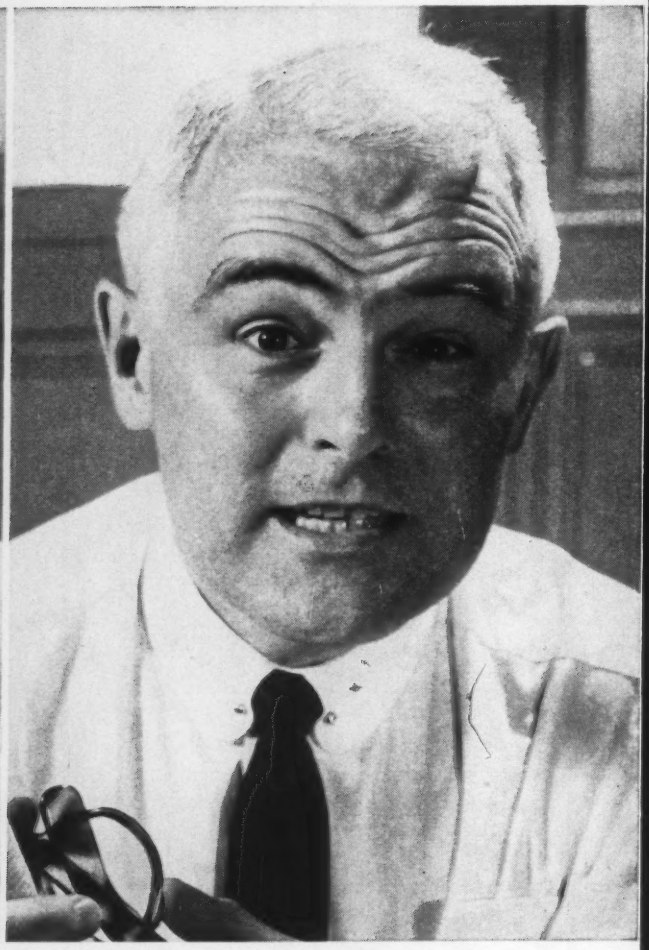
Two-Bearing Motor-Generator Set

GOODYEAR

Hose? Goodyear



THE KIND I NEED?
(No matter how tough or unusual your application or what type hose it calls for—*Goodyear has the answer!)*

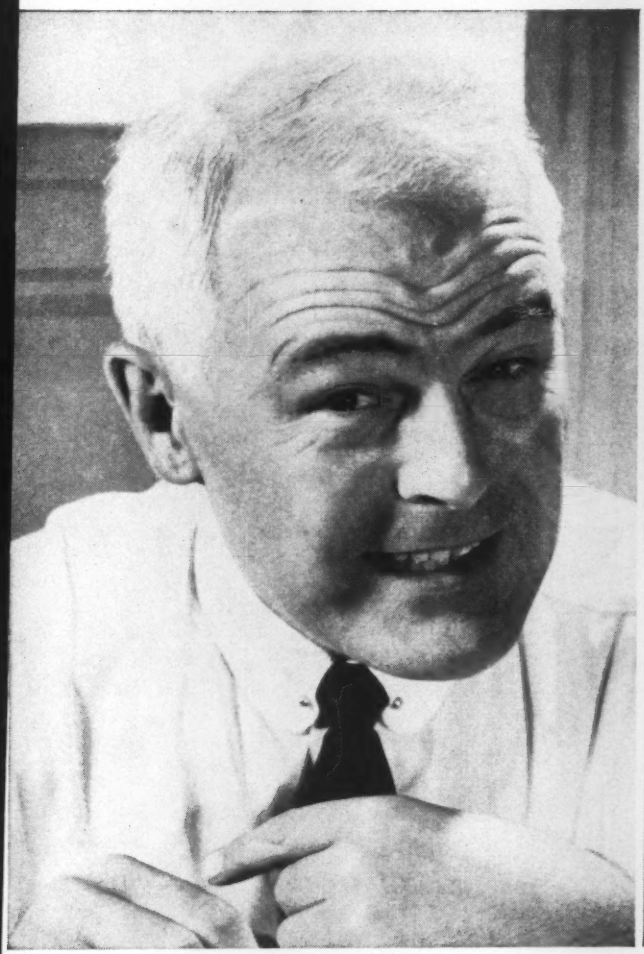


WHEN I NEED IT?
(When you need hose in a hurry—locally available right from distributor stocks—*Goodyear has the answer!)*

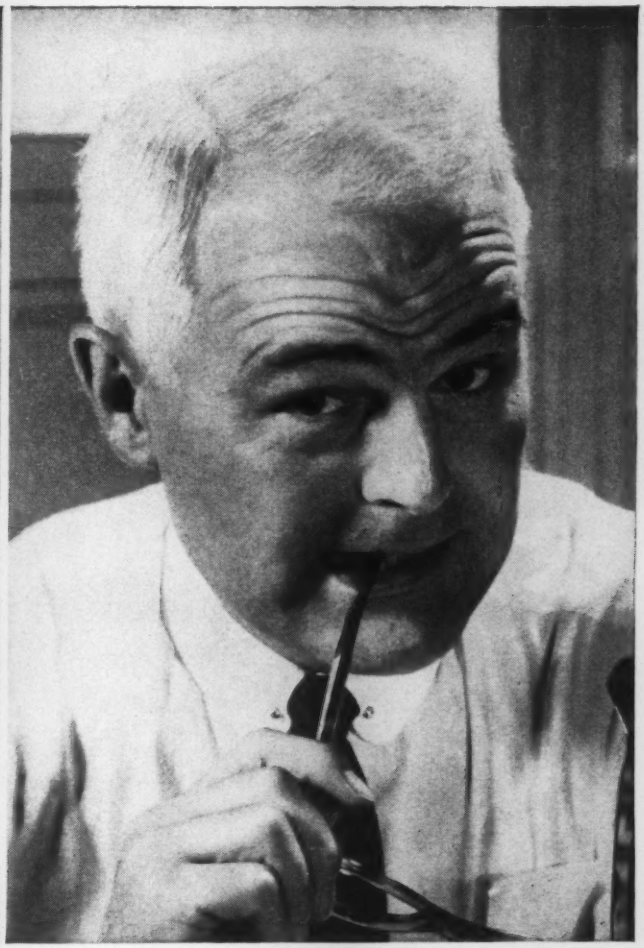
FOR THE RIGHT HOSE... AT THE RIGHT PLACE...
CALL YOUR GOODYEAR DISTRIBUTOR... first in

Lots of good things come from GOOD

Has All the Right Answers!



TOUGH AS I NEED IT?
(For the extra ruggedness, extra dependability and extra safety of real quality hose—*Goodyear has the answer!)*



SPECIAL HELP WHEN I NEED IT?
(Call for the advice of an expert like the G.T.M. – Goodyear Technical Man – and *Goodyear has the answer!)*

AT THE RIGHT TIME... AT THE RIGHT PRICE...
service with all industrial rubber products

Or write Goodyear, Industrial Products Division, Akron 16, Ohio

GOODYEAR INDUSTRIAL PRODUCTS

CLEANING *Specialists* FOR AMERICAN INDUSTRY

MISSILE CLEANING TOWERS AT DOUGLAS AIRCRAFT'S SANTA MONICA PLANT.

FULL-FLEDGED PARTNERS IN AMERICA'S VITAL AEROSPACE PROGRAM

Detrex know-how and superbly designed products are being supplied to the Aerospace Industry in constantly increasing amounts.

Practically every major industry in the country has benefited from the marked superiority of Detrex chemicals, equipment and service.

Here is a combination of facilities and services unequalled in its field.

There is only one Detrex—a single, quality source for all your metal cleaning requirements.

Write today for detailed information on our products or services.

Perm-A-Clor NA (trichlorethylene)
Solvent Degreasers
Ultrasonic Equipment
Aluminum Treating Compounds
Alkali and Emulsion Cleaners
Rust-Proofing Materials
Vapor Generators
Phosphate Coating Compounds
Paintbond Compounds
Extrusion and Drawing Compounds
Spray Booth Compounds
Industrial Washers

DETREX CHEMICAL INDUSTRIES, INC.
BOX 501, DEPT. IA-761, DETROIT 32, MICH.

MEETINGS

(Continued from P. 25)

Society of Plastics Engineers, Inc. —Regional Technical Conference, Sept. 12, Central Indiana Section, Severin Hotel, Indianapolis.

Non - Ferrous Founders' Society—Annual meeting, Sept. 17-21, Shawnee Inn, Shawnee-on-the-Delaware, Pa. Society headquarters, University Bldg., 1604 Chicago Ave., Evanston, Ill.

AEC Welding Forum — Annual meeting (classified), Sept. 20-22, Southwest Research Institute. Institute headquarters, Granada Hotel, San Antonio, Texas.

Industrial Electronics Symposium —Sept. 21-22, Bradford Hotel, Boston. Institute headquarters, 51 East 42nd Street, New York 17.

Pressed Metal Institute — Annual meeting, Sept. 24-28, The Grand Hotel, Point Clear, Ala. Institute headquarters, 3673 Lee Rd., Cleveland.

American Welding Society — Fall meeting, Sept. 25-28, Adolphus Hotel, Dallas, Texas. Society headquarters, 33 W. 29th St., New York.

Assn. of Iron and Steel Engineers —Annual convention, Sept. 25-28, Penn - Sheraton Hotel, Pittsburgh. Assn. headquarters, 1010 Empire Bldg., Pittsburgh.

American Die Casting Institute Inc. and The Die Casting Research Foundation—Annual meeting, Sept. 27-28, Edgewater Beach Hotel, Chicago. Institute headquarters, 366 Madison Ave., New York.

American Production and Inventory Control Society—Annual national conference and technical exhibit, Sept. 28-29, Pick-Congress Hotel, Chicago. Society headquarters, 330 S. Wells St., Chicago 6.

Purchasing Agents Assn. — 14th Pacific Inter-Mountain Conference, Sept. 29-30, Westward Ho Hotel, Phoenix, Arizona.

Strong Restraining Influences...

Roebling Hose Reinforcing Wire

Roebling Hose Wire, Hose Reinforcing Wire and Hose Wrapping Wire bear the stamp of Roebling's strict attention to constant uniformity. As with all Roebling wire products, each is wholly Roebling-made and Roebling-controlled, from open hearth to packaging. Tensile strength and forming qualities, finish and gage are of an excellence that proves itself in use.

Resistance to internal and external pressures and wear are what you look for in hose wires and what you pay for. With Roebling, you *get* them.

For further information on these and other Roebling quality products, write or call Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

Roebling...Your Product is better for it

ROEBLING

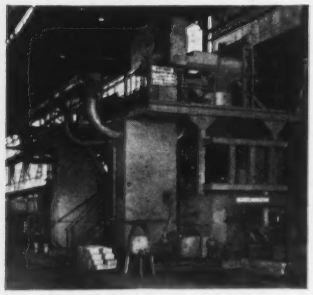
Branch Offices in Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corporation

What are the vital savings you want in descaling of strip, sheets, plate, wire rod, structural shapes, slabs or billets? If it's space savings, a Wheelabrator Mechanical Descaler will replace hundreds of feet of pickling tanks. If it's acid elimination, pickling with its attendant problems can be eliminated or radically reduced. If it's savings in metal, Wheelabrator descaling removes scale only. There's no metal loss. If it's cost reductions, a better finish, improved drawing, less handling or more rapid visual inspection, Wheelabrator can give you these savings. Wheelabrator gives you all this plus the Vital Value of experience—of being the initiator of blast descaling, of participating in more installations than any other firm. Ask for "Pictorial Report" Bulletin 156-D.

A demonstration of WHEELABRATOR'S

VITAL VALUES

8 vital savings in steel descaling



15,500 tons of carbon steel strip a month is Wheelabrator descaled in the modern mill of Altos-Hornos De Mexico SA. Steel is descaled at (up to) 200 f.p.m. contrasted to only 100 f.p.m. by previous pickling method.

VITAL VALUES FOR INDUSTRY

WHEELABRATOR

STEEL DESCALING EQUIPMENT

WHEELABRATOR CORPORATION, 510 S. Byrkit St., Mishawaka Indiana. In Canada, WHEELABRATOR CORPORATION OF CANADA, LTD. 1901 Birchmount Rd. P.O. Box 490, Scarborough, Ontario
A subsidiary of Bell Intercontinental Corp.

Photo by Courtesy of Weirton Steel Division of National Steel Corporation

How does your slag go to pot?

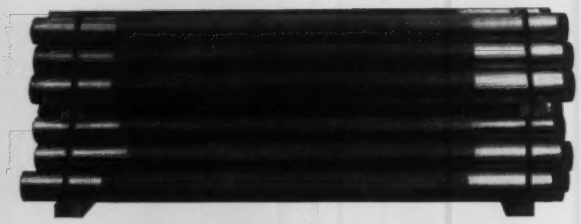
with Mack-Hemp pots the choice is virtually unlimited

we'll fit size and shape to your need.

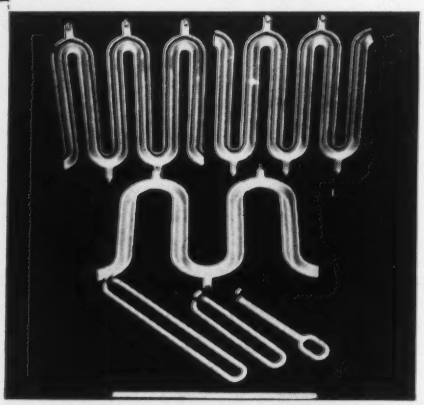
MACKINTOSH-HEMPHILL • Division of E. W. BLISS COMPANY

Pittsburgh and Midland, Pa.

Duraloy Tubes and Grids *to Meet Exacting* THE ELECTRIC EF FURNACE CO GAS • OIL • ELECTRIC *Specifications*



Duraloy Centrifugally Cast Tubes 7'9" long, 7" O.D., 3/8" wall. 28 Cr 10 Ni; some of HOM alloy.

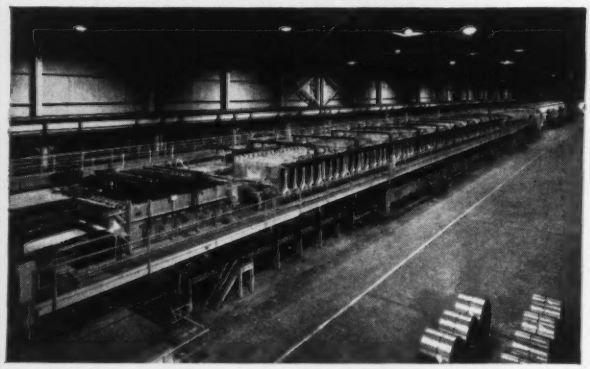


Duraloy Resistance Grids—Shell Molded. 18 Cr 38 Ni; some of special HOM alloy.

Heat treating furnaces need high alloy castings... radiant heat tubes for gas or oil fired... resistance grids for electrical... and castings for handling material through the furnace. *And the castings must be fail-proof!*

One reason—indeed the major reason—why The Electric Furnace Company, Salem, Ohio, has leaned so heavily on Duraloy for its castings is that over the years Duraloy Castings have established a fine record for durability and uniformity. And with the recent development of Duraloy HOM, the furnace company can work towards higher temperature operations. HOM can be used quite broadly at temperatures up to 2200°F and in a limited way to 2300°F. It can be cast statically, centrifugally and shell molded.

When such an authority on heat treating furnaces as Electric Furnace so consistently selects Duraloy castings for these furnaces on which it has built an enviable reputation... that preference suggests quite strongly that Duraloy castings are consistently sound and skillfully alloyed to meet exacting high temperature applications. This same skill offers comparable values to all who require high alloy castings.



Annealing furnace designed and constructed by The Electric Furnace Company used for cycle annealing of enameling iron strip and bright annealing of cold rolled strip. Three methods of heating: direct fuel fire; fuel fired radiant heat; and electric resistance used in the various zones.

The DURALOY Company

OFFICE AND PLANT: Scottdale, Pa.

Eastern Office: 12 East 41st Street, New York 17, N.Y.
Chicago Office: 332 South Michigan Avenue, Chicago, Illinois
Detroit Office: 1025 Maple Road, Troy, Michigan
Houston Office: 4101 San Jacinto, Houston, Texas

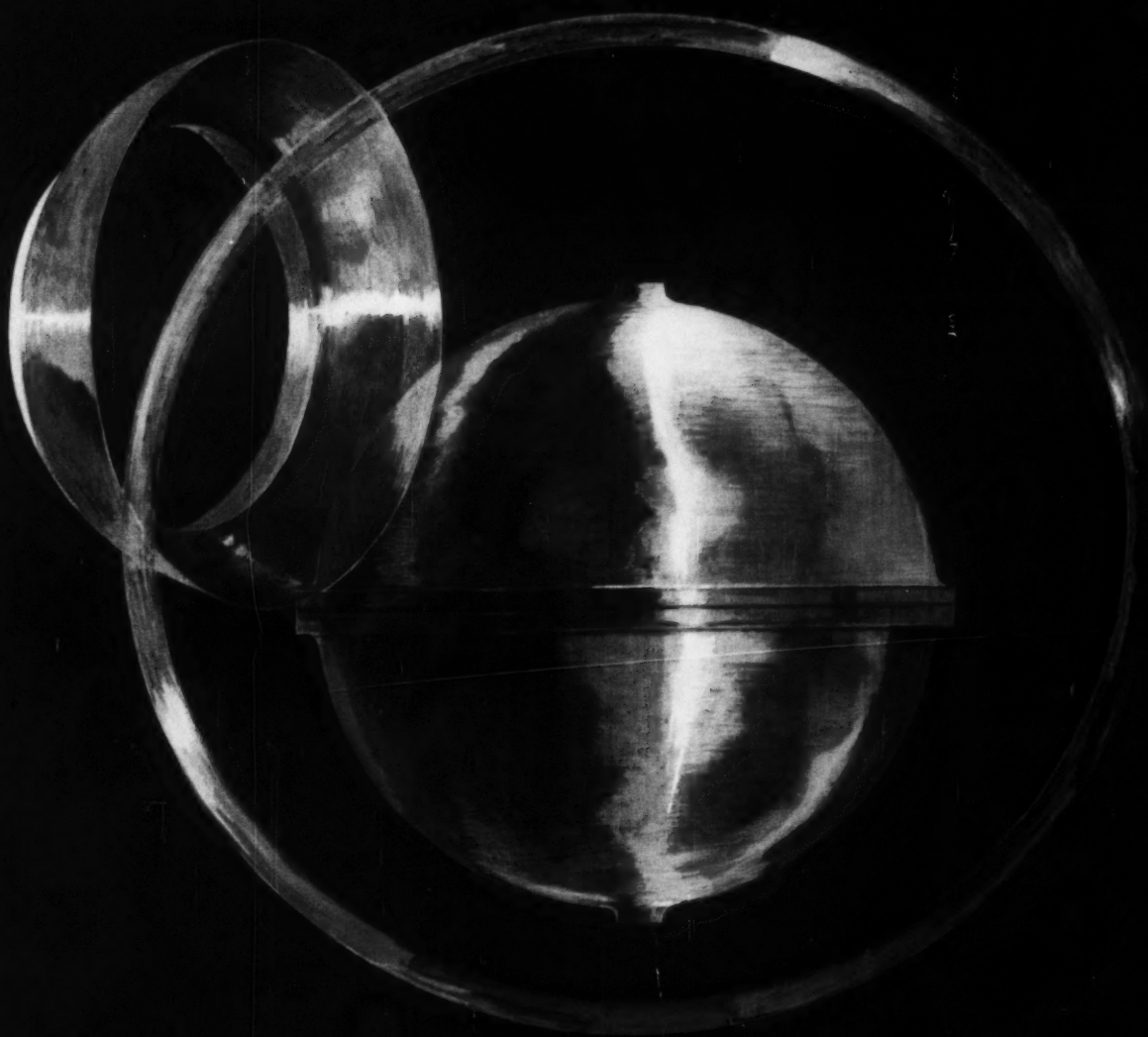
ALLOY CASTING INSTITUTE ACI MEMBER

What's *your* problem? If it involves forgings, rings or castings for special applications—where high temperature, corrosion or high stress limit the usefulness of ordinary steels—try Standard. We're specialists in superstrength and stainless alloys, and if it's *quality* you want, that's been our hallmark for more than a century and a half.

Electric furnace, vacuum degassed steels, vacuum melted alloys, aluminum and titanium are specialties at Standard. We serve leading industries throughout the nation. To name a few just to give you an idea: shipbuilding, rubber, missiles, paper machinery, machine tools, railroads, turbines, large and small.

EXOTIC STEELS

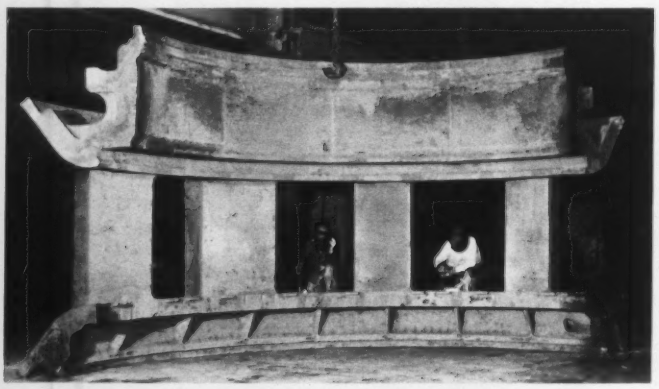
FROM STANDARD



QUALITY CONTROL IS SECOND TO NONE AT STANDARD. Quality control at Standard is maintained by the most accurate, up-to-date testing equipment available. Laboratory facilities operate day and night to support our metallurgists, shop foremen, mill and machine operators—as well as plant management and, of course, our customers.

STANDARD'S OPEN-DIE FORGINGS SUPPLY NATION'S LEADING INDUSTRIES. Steel and nonferrous alloys can be worked in Standard's forge shop, including some hard-to-work metals such as titanium and super alloys. It can turn out forgings from 15 to 52,000 lb.; up to 45 inches in diameter; and up to 60 ft. in length. Major products include rotors and wheels for turbines, propeller shafts for ships, rolls for sugar, printing and rubber industries.

Standard's hundreds of customers represent every major industry in the world. Metal components of carbon and alloy steels, super alloys, and nonferrous alloys such as aluminum and titanium are supplied by Standard for an endless line of products. What particularly impresses our customers however, is the unique, personalized service we provide. See for yourself—bring your next problem to Standard.



STEEL CASTINGS TO VIRTUALLY ANY SPECIFICATIONS. The Standard foundry, one of the larger ones in the country, has turned out castings as light as 1 lb., and ranging up to 85,000 lb. They include some of the largest heads ever cast for dredge cutters and also vital components in huge hydroelectric projects throughout the world. Standard yields to none in the skill of its foundry engineers, metallurgists, molders, coremakers and core setters.

PIONEERS IN ROLL-FORGED RINGS . . . STANDARD. Standard's craftsmanship in forming metal rings for heavy industry dates back to 1856. The first all-forged weldless rings were produced in volume for the first time in 1870—at Standard. And much of the development work in forging weldless rings of high-alloy steels, aluminum and titanium has been done in Standard's Ring Department.

Standard Steel Works Division

BALDWIN · LIMA · HAMILTON

BURNHAM, PENNSYLVANIA

Rings • Shafts • Car wheels • Gear blanks • Flanges • Special shapes

BALDWIN BLH LIMA-HAMILTON

Printed in U.S.A.

MI-61-2

How to automate step by step

Automation means many things to many people . . . ranging from the simple sequencing of individual operations to the completely automatic system.

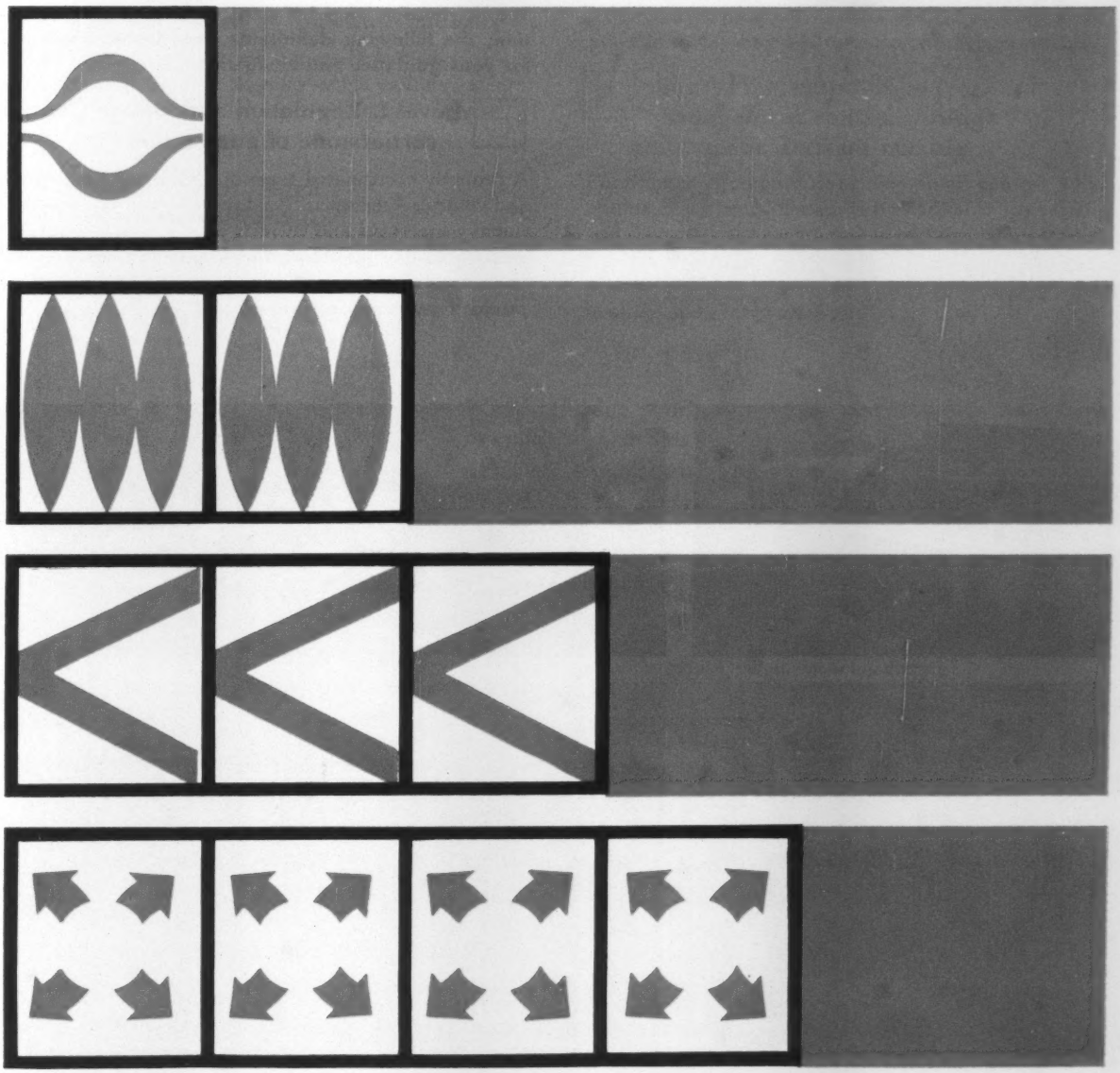
Westinghouse has chosen the term "Progressive Automation" to describe a step-by-step application and coordination of electric drive systems . . . executed in stages that are completely compatible to your cost-reduction, production quality and equipment modernization goals.

Such a step-by-step concept permits you to realize immediately higher mill rates, better steel quality and longer mill equipment life in those individual operations that are initially automated . . . and at the same time, moves you a big step closer to the full profit and production benefits of completely automated facilities.

Westinghouse, the leader in this field, is ready to work with you at whatever level you are currently concerned with . . . from simple process regulation to ultimate continuous decision-making computer control.

What level of Westinghouse's "Progressive Automation" meets your current needs best? Let's examine the definitions on the following pages . . .

Westinghouse



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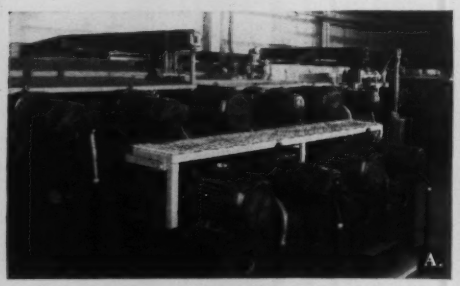
Westinghouse can help you plan the levels best for you . . . apply them as fast as you want

To properly relate your current operations to the Westinghouse "step by step" approach to automation, the following definitions have been developed for your guidance and evaluation:

Level I. Regulation and Gauge Control —cornerstone of automation

A properly coordinated team of power supplies, motors and controls—the operational muscles and brains—continually supervises and corrects process variables such as voltage, tension, speed, torque, position, dimensions and temperatures . . . for better product quality, greater productivity.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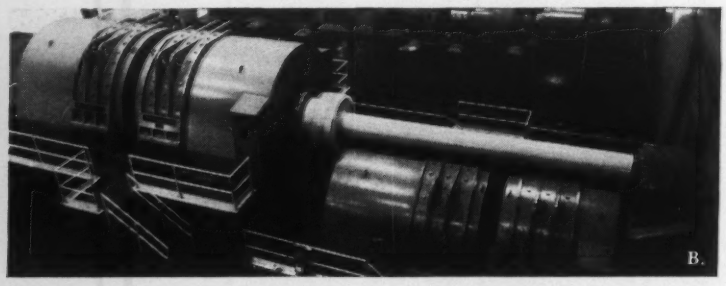
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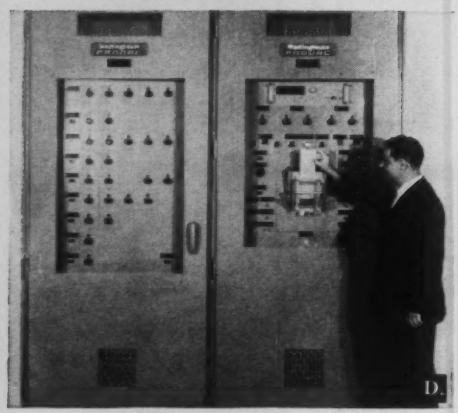
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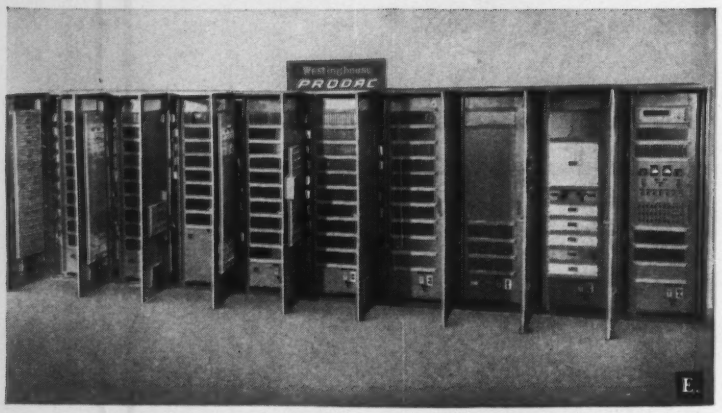

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Level II. Programming—the right action at the right time automatically

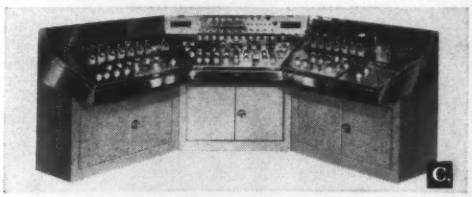
Pre-selection, by means of information contained on punched cards, tapes or manual setups, of the sequence of events and information needed by the regulating system, to control the process.

Level III. Data Logging—fast, precise information

Automatic collection and storage of operating and process information for use when needed—in the form needed. Data logging and display can provide immediate production data for quality control, etc., can record information required to re-program, and can operate as part of a computer in monitoring and optimizing mill performance.

Level IV. Computing—management control through automatic decision making

Continuous decision-making computer control which optimizes the mill operation by constantly monitoring and correcting the programming and regulatory systems. These corrections are required because of changes in process elements, environmental conditions, equipment loading, and other variables.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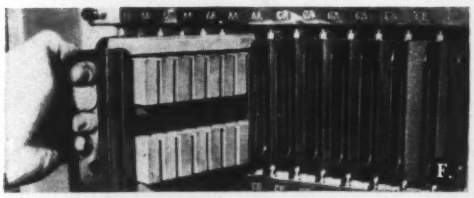
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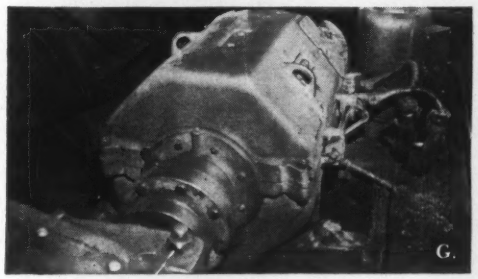

G.

Westinghouse products permit you to realize optimum results at every level of automation

A. Westinghouse Life-Line® motors and Moduline® gearing installed in cleaning section of 50-inch continuous annealing line.

B. Mill muscles are dependable Westinghouse motors with exclusive Thermalastic® insulation on armatures. This 12,000-hp twin drive is conservatively rated . . . designed for rugged rolling mill duty.

C. Typical operator's control pulpit for computer controlled mill.

D. Input portion of data accumulation system with manual switches on left—punched card reader on right.

E. Complete automatic mill operation is possible with Westinghouse on-line industrial Prodac* control computer.

F. Prodac module, representing a circuit function, is easily accessible for removal or replacement.

G. Westinghouse heavy-duty d-c mill motors provide power for toughest applications. On steel mill screwdowns, improved field coil design adds more copper for greater capacity and longer life.

For other considerations affecting your use of Westinghouse *Progressive Automation*, see the next page . . .

*Trademark

Westinghouse

How to apply Progressive Automation to your mills

Exactly where and how can you begin to blue-print your over-all automation plan that will reap all these benefits for your production? The best answer is to begin with the best qualified scource: Westinghouse, who has designed, built and installed more automatic production systems in steel mills than any other manufacturer.

Westinghouse—one source, one responsibility

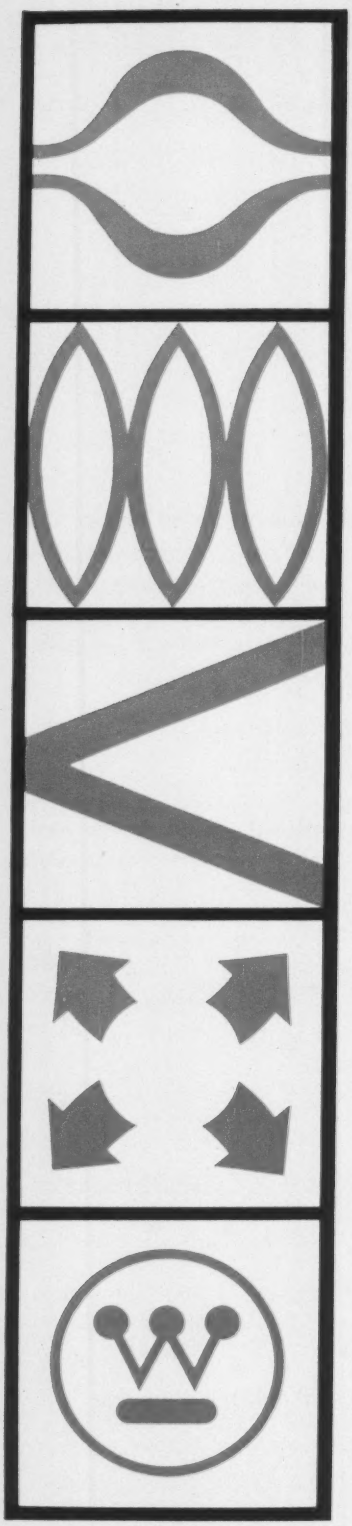
Westinghouse experience, facilities, engineering talent and equipment add up to your assurance of:

1. A sound analysis of your automation needs to determine the automatic systems best suited to your processes.
2. A coordinated systems approach of motors and controls, thoroughly engineered and completely tested, which integrates the stages of automatic production you need.
3. An automatic control system designed for application to your mill in line with the Westinghouse concept of *Progressive Automation.*
4. The use of the latest automation techniques and components—all adaptable to future developments and needed expansion.
5. A single source, a single responsibility for complete automation systems and related electrical equipment.

These complete Westinghouse facilities are available to you. Call your nearby Westinghouse representative, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania.

You can be sure . . . if it's Westinghouse

Westinghouse



Interested in more information on Westinghouse Progressive Automation for the steel industry? Write for B-8220, a complete set of new brochures describing Automation "steps" in detail as they relate to steelmaking operations. You can reserve a set for your use by indicating your area of interest on your company letterhead and mailing it to: Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

UNBREAKABLE!

This is a punishing test for a hack saw blade. We do it to prove that a Marvel High-Speed-Edge Hack Saw Blade is unbreakable. A Marvel Blade can be bent like this thousands of times and it still won't break.

Why? Because the blade body—to which a high speed steel cutting edge is welded—is made of a tough, non-brittle alloy steel designed to take the heaviest feed pressures and highest speeds any modern hack sawing machine can develop.

What does this unbreakable feature of Marvel Blades mean to you?

1. Operators, knowing they can trust Marvel Blades not to break, tension them truly taut (from 200% to 300% more than ordinary blades) to produce maximum obtainable accuracy of saw cut.
2. They can safely apply heavier feed pressures and higher speeds without endangering themselves or the machine to produce faster cutting-off.
3. Longer cutting life is assured because the blade simply won't break.

Ask for Marvel High-Speed-Edge Hack Saw Blades by name and you can be sure you're getting the unbreakable blades designed to give you maximum accuracy, speed, and safety in your cutting-off operations. Leading Industrial Distributors have Marvel Blades in stock.

MARVEL *Metal Cutting* **SAWS**

BETTER MACHINES
BETTER BLADES

ARMSTRONG-BLUM MANUFACTURING CO. • 5700 Bloomingdale Avenue • Chicago 39, Illinois

B-1128

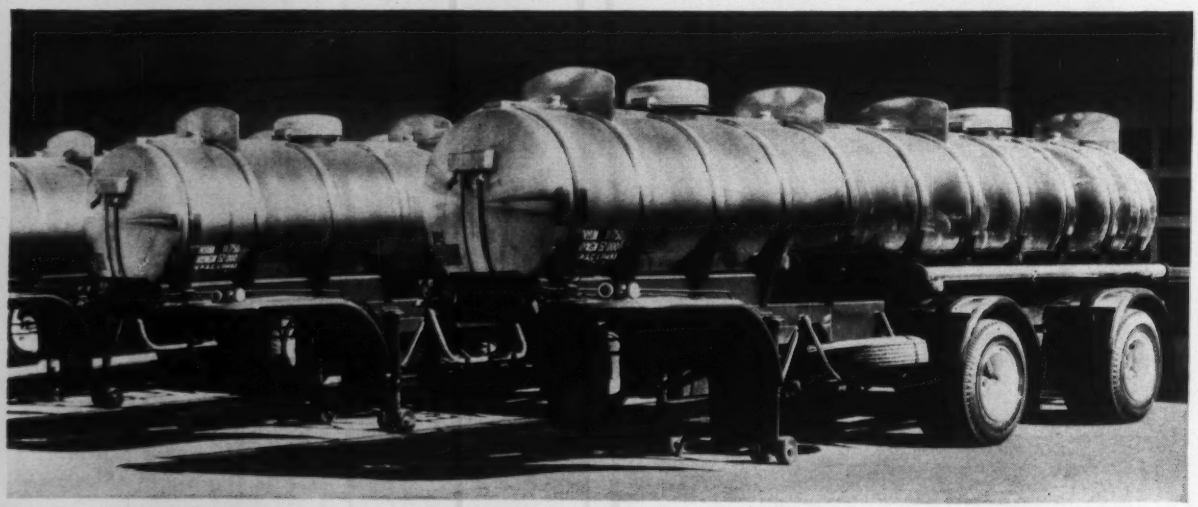
For Stainless Steel, call your nearest Steel Service Center.

Outsmart corrosion with USS Stainless Steel

What's your corrosion problem? Acid? Water? Harsh atmospheres? Solve it with Stainless Steel. Whether you operate a tank truck fleet or manufacture fine paper, whether you specify switch lamps or build skyscrapers, Stainless Steel offers unsurpassed resistance to crippling corrosion.

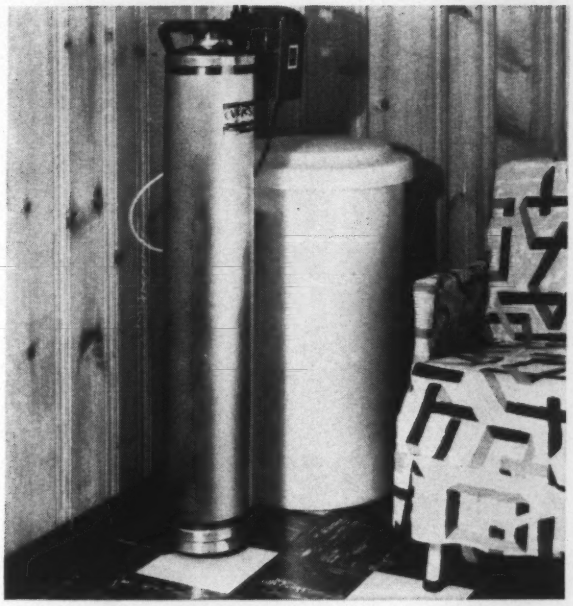
In industrial applications, Stainless Steel resists the corrosive effects of strong acids, so equipment lasts much longer, eliminating premature shutdowns. Stainless is strong, too, so it can be used in critical applications without fear of breakdown. In the chemical industry, Stainless is widely used because it is so easy to clean and does not become contaminated. These same advantages make Stainless ideal for the drug industry (where absolute sanitation is a must) and even for hospital operating rooms (which are almost all Stainless these days).

Stainless Steel can give a product the competitive edge. Its worth to you is far greater than its additional cost because of its excellent corrosion resistance, strength, appearance and superior heat resisting properties. Design quality and long life into your product—design with Stainless Steel. We welcome a chance to work with you when you are planning new products made from Stainless Steel. For more information write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS is a registered trademark.



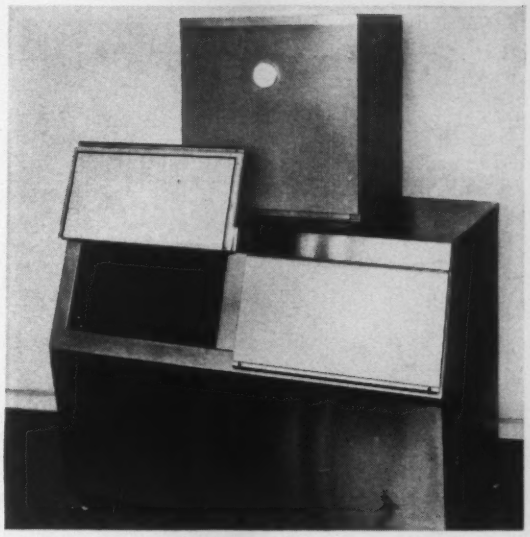
No Stainless Steel tanker has ever worn out.

The tankers here are fabricated from type 304 Stainless Steel, and can carry a variety of acids and chemicals with only a clean-out between trips. No worries about cargo contamination or corrosion, even from many harsh acids. And because Stainless cleans more quickly, the tankers are loaded for the return trip sooner . . . another marketing edge because of Stainless. No Stainless Steel tanker has ever worn out. Tank trailers manufactured by the Tank Division of The Heil Company of Milwaukee, Wisconsin.



How to soften water with Stainless.

This Stainless Steel water softener will last. It is corrosion-proof inside and out. Stainless Steel resists the strong corrosive action of the brine used in the softening process so maintenance is sharply reduced and the tank will last longer. You can install it in your cellar game room and you won't have to worry about appearance because an occasional wipe with a damp cloth will keep it clean and shiny—always. Water softener is manufactured by General Ionics Division of Salem-Brosius, Inc., Carnegie, Pennsylvania.



Keep cool with Stainless.

Ice cube bins provide their owners with an assured inventory to meet unpredictable demands. The service of providing ice cubes to the public is full of peaks and valleys of requests. Bins made of Stainless Steel can meet all these situations with steady performance. Inside, they will always be sanitary because they won't corrode and even the harshest cleaning agents won't harm the surface. Outside, their shiny appearance will always stay shiny for the same reasons. Bonus: because Stainless is so strong, it resists the bumps and thumps of hard usage, doesn't dent or "dimple." Ice chest is manufactured by the Roy Follett Corporation of Phillipsburg, New Jersey.

Stainless Steel switch lamps cost the same as cast.

The housing for this railroad switch lamp is all Stainless. It stands out in the weather all year 'round. Many of these lamps have been in continuous service for five years without one sign of corrosion. This lamp is lighter than cast units, yet costs no more. For interior maintenance, the hinged top opens instead of swinging the entire body open as in previous cast lamps. Here dependable Stainless gives a light, first-class housing. Switch lamp manufactured by Lovell-Dressel Co., Arlington, N. J.

Why Stainless Steel is preferred in the pulp and paper industry.

One paper manufacturer puts it this way: "Stainless is used extensively to resist corrosion from acid conditions present in many operations. One important use is for piping pulping liquors. Stainless is preferred for its low cost, cleanliness and ease of maintenance." Papermaking machines are now being built of Stainless because it is the best investment a company can make in terms of long life, corrosion resistance, ease of cleaning and reduced maintenance.

USS United States Steel

Udylite Full Automatic Rack Plating Machine photographed on April 4, 1961, at the Chromcraft Corporation. First placed in operation on October 1, 1950. 64′ 4″ long, 12′ 4″ wide, with a ceiling height of 15′ 1″. Racks are 30″ x 30″ x 60″ and tanks are 6′ 6″ deep, 56″ wide.

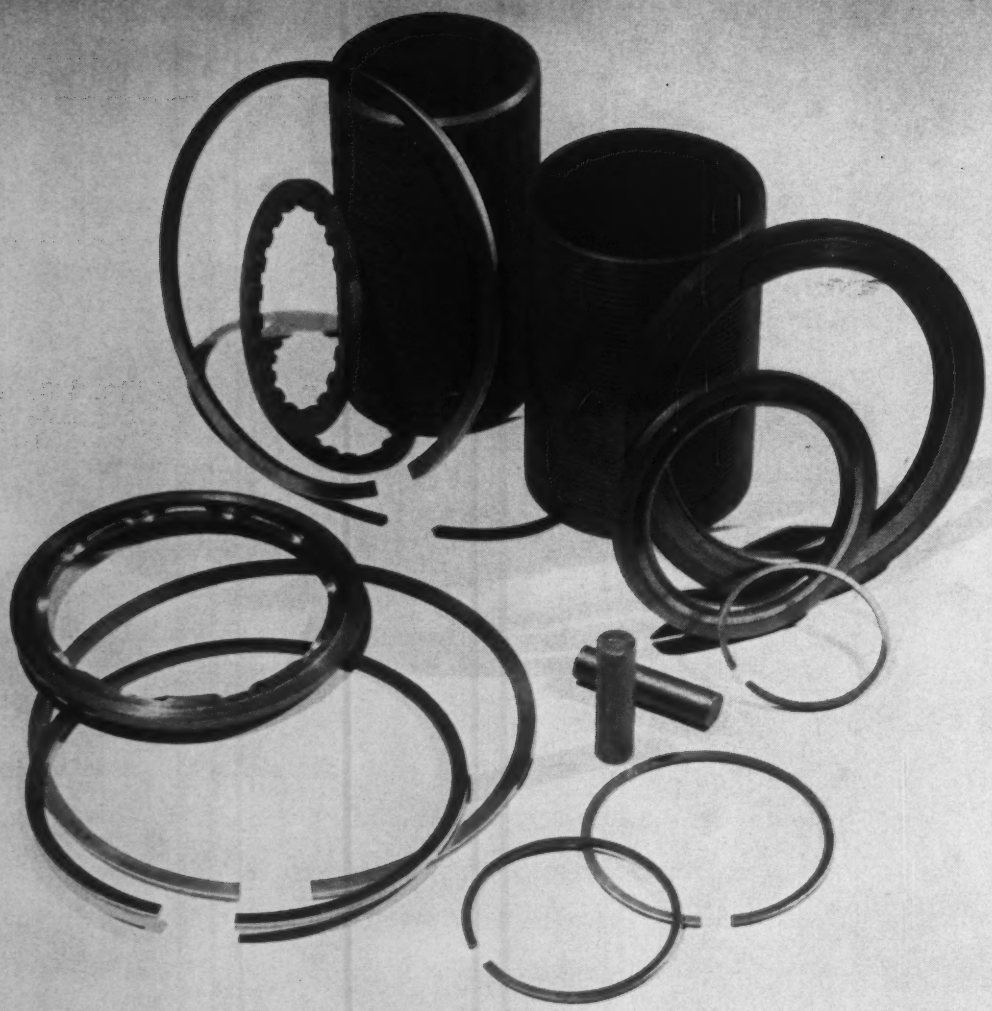
in ten years!

Udylite Full Automatic plates 13 miles of tubing per day for metal furniture leader!

"Our Udylite Full Automatic Rack Plating Machine has more than met extremely heavy production schedules over the last 10-year period—without any significant downtime other than process change-over," states Mr. Irwin C. Keefer, Vice President of the Chromcraft Corporation, St. Louis, Missouri. ■ A leader in the metal furniture industry, Chromcraft Corporation produces more than 500 tables and 3,000 chairs per day. Tubular metal legs and frames are first bright nickel plated in a Udylite Incomparable "66" Process bath. Later they are chrome plated or finished with a gold aniline epoxy coating. ■ "We selected this return-type automatic on the basis of successful past performance of our other Udylite equipment. The need for increased production with uniform high plating quality, ease of operation and reduced maintenance requirements were additional considerations of importance," continues Mr. Keefer. ■ To find out how a Udylite Full Automatic, engineered to meet your specific plating requirements, can improve your production and profit picture, contact your local Udylite Representative, or write:

Udylite

THE UDYLITE CORPORATION
DETROIT 11,
MICHIGAN

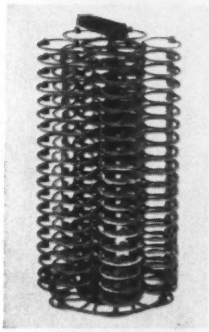


Cast iron parts, produced by Perfect Circle's unique casting techniques, are used in critical wear points in both cast iron and non-ferrous engines. Cylinder liners are centrifugally cast, piston inserts and rings are produced by the stacked mold process. Gray iron valve guides are virtually a must for engines with non-ferrous cylinder heads. In each case, Republic Pig Iron is the base metal. Simple economics dictate the use of cast iron parts to resist wear at critical points.

REPUBLIC PIG IRON SPECIFIED FOR STACKED MOLD, CENTRIFUGAL CASTING

Uniform Chemistry, High Quality are Ideal for Unique Processes

In these two casting processes—stacked mold and centrifugal—Perfect Circle Corporation maintains stringent quality control programs. Control begins with the selection of pig iron. To suit Perfect Circle's metallurgists, the iron must have a perfectly uniform chemical composition with exact graphite distribution, and be of consistent high quality. To produce the gray iron parts on the opposite page, by the casting methods described below, Perfect Circle selected Republic Pig Iron as the base metal.

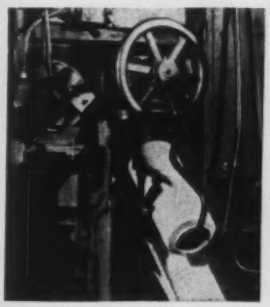


STACKED MOLD

In this process, stacks of green sand molds move along conveyors to the pouring station. Metal may come direct from a cupola or from an electric furnace. As the stacks cool they move to the shake-out station, where the cast "Christmas trees" are lifted and shaken free of the copes and sand.

By this process, Perfect Circle is able to produce several hundred castings at one pour. Dimensions are limited only by the depth and diameter of the cope.

CENTRIFUGAL



This process begins with installation of a permanent mold into a spinner where it is heated, spun to an interior force of 120 gravities, and coated. A measured weight of metal is poured into the mold. Through precise control of the mold temperature and the coating, the cooling rate is regulated to produce the desired microstructure. The spinning process squeezes gases and nonmetallic impurities out of the metal, and continues until the casting temperature drops to 1500°–1700°. The finished casting is then removed.

The castings are end-cropped to length and machined. The process allows a significant reduction in scrap loss, stock removal allowances, machining time, and costs.

REPUBLIC'S COMPLETE FOUNDRY ENGINEERING SERVICE is available to all foundries without obligation. Republic Foundry Service Engineers can supply ideas, suggestions, and information to benefit every department of your foundry operation. They can recommend, from industry's most complete line of merchant pig iron, the grade best suited to your requirements: Chateaugay; Northern Foundry, Malleable, Bessemer and Basic; Southern Malleable, Foundry and Basic.

REPUBLIC STEEL

PRODUCER OF INDUSTRY'S MOST COMPLETE LINE OF MERCHANT PIG IRON

REPUBLIC STEEL CORPORATION
DEPT. IA-2272
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

☐ Have a Foundry Service Engineer call.
☐ Send more information on Republic Pig Iron.

Name_____ Title_____

Firm_____

Address_____

City_____ Zone_____ State_____

NOW AVAILABLE SEAMLESS STAINLESS TUBING AND PIPE MADE BY *Carpenter*

Each length of Carpenter Seamless Stainless Tubing and Pipe is initially hot extruded from a trepanned billet shown at top of picture.

Produced by Best Extrusion Process

Carpenter SEAMLESS Stainless Tubing and Pipe are made with the accent on quality and uniformity at every stage of manufacture from raw materials to finished products. They are initially hot-formed by the highly perfected Ugine-Sejournet patented extrusion process. Stainless alloys for making these new products are produced in Carpenter's own specialty steel mill to closely balanced analyses. Extremely uniform structure and utmost freedom from internal flaws due to segregation and center line weakness are assured in these stainless steels by Carpenter's exclusive MEL-TROL® process. Cold finishing of all Carpenter SEAMLESS Stainless Tubing and Pipe assures extremely close accuracy of O.D. and I.D. dimensions, excellent physical properties and super-smooth surface finishes. Optimum corrosion resistance and working properties are made certain by careful annealing, pickling and passivating under strict quality control. Final tests and inspections insure that the finished SEAMLESS stainless products will always be "as ordered" and capable of giving the dependable, cost-saving service expected of them.

Wide Range of Types, Sizes and Gauges

Carpenter makes SEAMLESS Stainless Tubing and Pipe in a full range of standard analyses and in Carpenter Stainless No. 20Cb. **Tubing Sizes** range from ¼" through 6⅝" O.D. with wall thicknesses of .004" to .864".

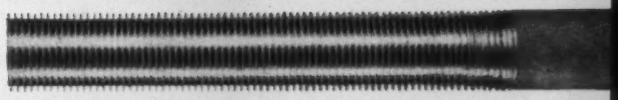
Pipe Sizes are ⅛" to 6" in Schedules 5, 10, 40, 80, 120, 160 and Double Extra Heavy. **Surface Finishes** ranging from as-drawn to 320-grit polish can be provided on the I.D. and/or O.D. as required. Tubing in all types and sizes is regularly furnished in lengths up to 45 feet. Longer lengths are available within certain specifications. Carpenter SEAMLESS Stainless Tubing and Pipe can be supplied to most ASTM, AMS and Government Specifications and also to meet individual users' special requirements. This new Carpenter service on SEAMLESS stainless tubing includes various shapes, integral-finned tubes and bi-metallic tubes of various ferrous and non-ferrous combinations.

Million-Dollar Stocks Expedite Deliveries

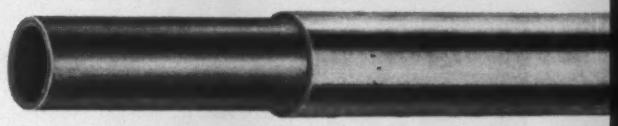
Popular types and sizes of Carpenter SEAMLESS Stainless Tubing and Pipe, including Heat Exchanger Tubes, are available from large warehouse stocks in principal U. S. cities. Total value of these stocks is over one million dollars! . . . so you can count on prompt deliveries from Carpenter. Large or small orders can be cut to length to your exact requirements. Orders for non-stocked types and sizes will get the best mill delivery available anywhere. Call or write your nearest Carpenter Representative, Warehouse or Distributor for the latest Stock List.

Selection Geared to Service

As a producer of both seamless and welded stainless tubing and pipe, Carpenter offers impartial assistance to match stainless tubing and pipe to service conditions for best all-around results. Carpenter Service provides technical help in solving corrosion, high temperature, fabricating and other problems; recommendations for improving the cost-life ratio of existing stainless tubing and pipe applications and dependable mill performance on special requirements. Send for new Selecting and Buying Guide, Bulletin TD 128, The Carpenter Steel Company, Alloy Tube Division, Union, N. J.



Integral-Finned Tubing



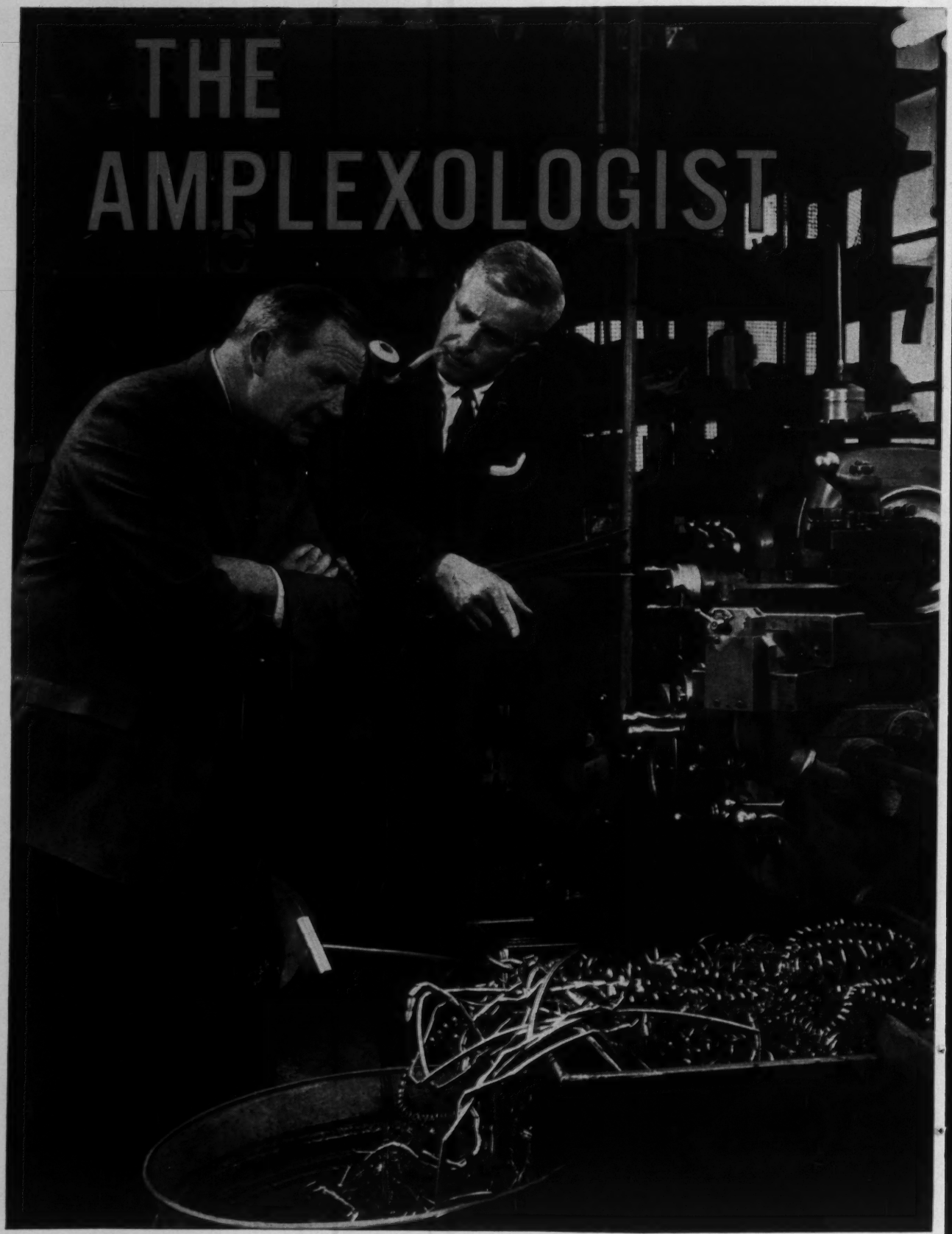
Bi-Metallic Tubing

selection geared to service

Carpenter steel

The Carpenter Steel Company, Main Office and Mills, Reading, Pa.
Export Dept., Port Washington, N. Y.—"CARSTEELCO"
Alloy Tube Division, Union, N. J.
Webb Wire Division, New Brunswick, N. J.
Carpenter Steel of New England, Inc., Bridgeport, Conn.

THE AMPLEXOLOGIST



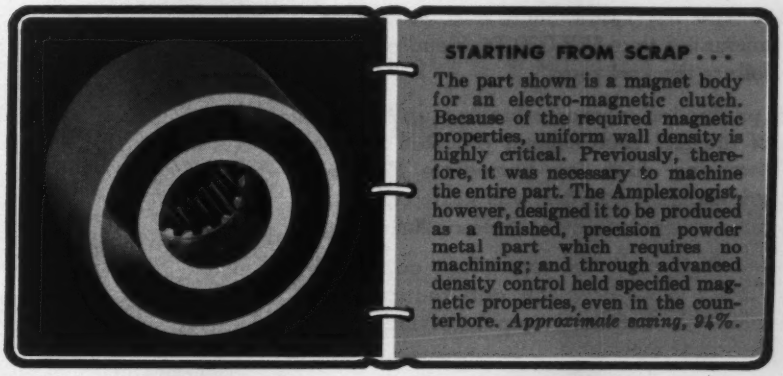
...STARTS FROM SCRAP

One thing about a scrap pile. You can walk around it. But you can't talk it away. That's why the Amplexologist—especially when he's calling on a manufacturer who knows little about powder metallurgy and cares less—often asks:

How much does it cost you to make this scrap?

Loaded question? Sure. Sometimes shakes a man up a little, too. Which is good: makes him more receptive to the word. Namely: advanced powder metallurgy uses only as much material as is necessary to produce a finished, precision part; a part which requires no machining and often costs no more than a rough casting. Eliminates waste material; eliminates the cost of *making* the waste. Often improves the product, too.

Well, once the message gets through—*m-o-n-e-y*—most manufacturers are eager for applications. Like, noon yesterday. Their enthusiasm for cutting out the scrap has helped make us the world's largest and most experienced producer of powder metal parts. Another reason leading manufacturers say: **When it comes to powder metallurgy, Amplex has the answer.**



STARTING FROM SCRAP . . .

The part shown is a magnet body for an electro-magnetic clutch. Because of the required magnetic properties, uniform wall density is highly critical. Previously, therefore, it was necessary to machine the entire part. The Amplexologist, however, designed it to be produced as a finished, precision powder metal part which requires no machining; and through advanced density control held specified magnetic properties, even in the counterbore. *Approximate saving, 94%.*

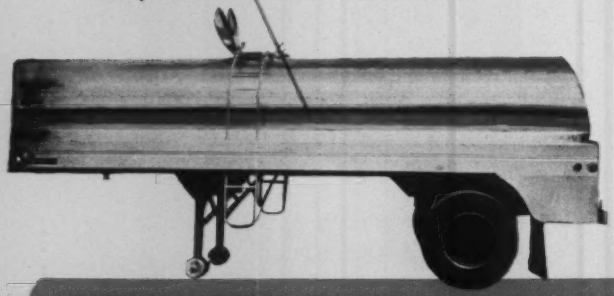
AMPLEXOLOGIST

AMPLEX

DIVISION CHRYSLER CORP., DETROIT 31, MICHIGAN

A CHRYSLER OILITE PRODUCT

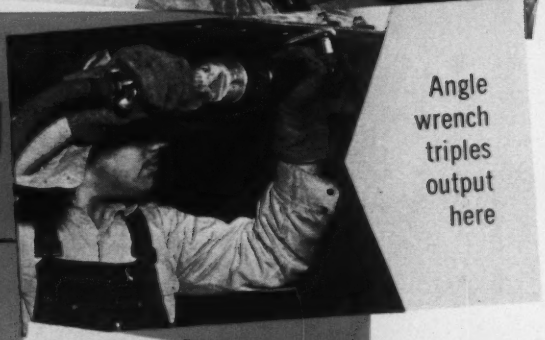
the product milk tank trailer



INCREASED OUTPUT PAYS FOR RETOOLING PROGRAM IN 58 DAYS...

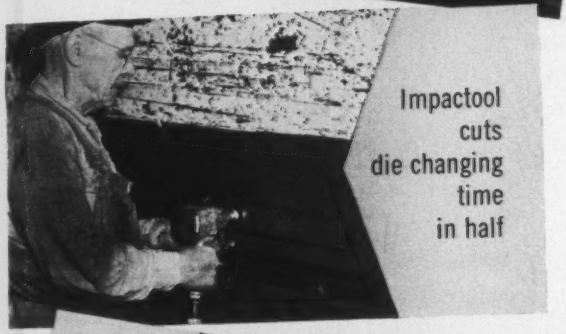
NETS $58,000 DIVIDEND/YEAR!

15,000 rpm grinder speeds weld removal



Angle wrench triples output here

Bolt assembly time cut by 67%



Impactool cuts die changing time in half

5 man-hours a tank saved running self-tapping screws

Inefficient and outdated power tools were costing this plant money. A power tool study revealed that in the assembly of tank trucks alone, 29 out of 66 tools were operating at only 40 to 50% efficiency.

New, more efficient Ingersoll-Rand Air Tools with full power and speed replaced the old tools. Fifteen additional I-R tools were installed to cut fabrication time on other operations. Leaks, faulty oilers and air filters were corrected. The net result: increased production that amounted to a $58,000 Dividend on Payroll Dollars the first year.*

With production increases making up the full cost of the tool replacement program in just 58.6 working days, an immediate Planned Annual Retooling program was started to maintain peak tool efficiency and maximum output.

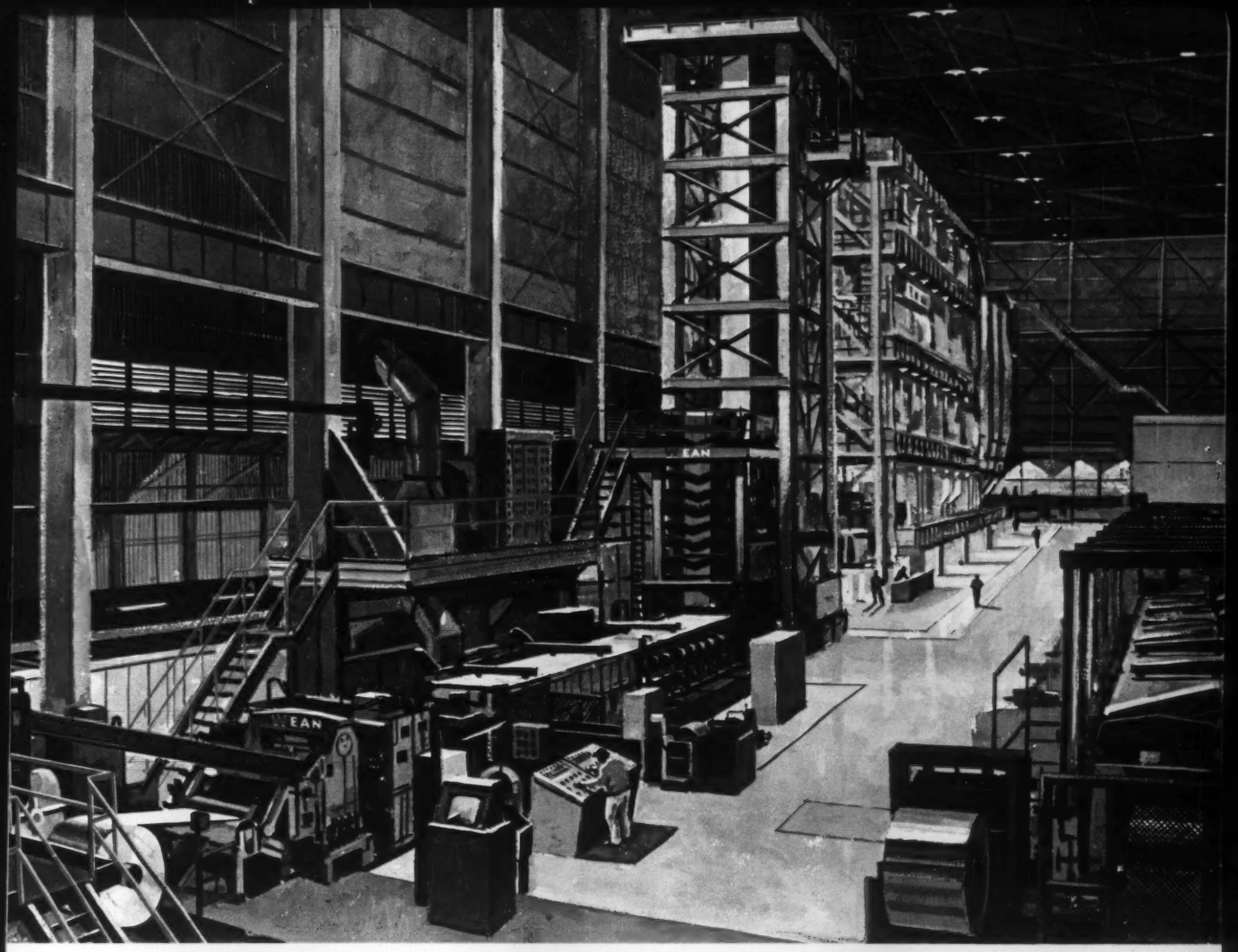
A power tool study in your plant can more than likely show how you can reduce your costs through increased output per man with more efficient tools.

*For details, call your I-R AIRengineer or write Ingersoll-Rand, 11 Broadway, New York 4, N.Y.

216A-8

Ingersoll-Rand

Planned Annual Retooling increases output per man



PORTRAIT OF PROGRESS: *Wean Tin Plate Annealing Line at J&L's Aliquippa Works*

J&L Cuts Production Time, Improves Quality with Wean Tin Plate Annealing Line

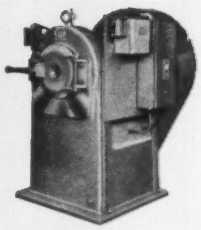
Jones & Laughlin Steel Corporation's new Wean tin plate annealing line is a major part of the company's tin mill modernization at Aliquippa. Continuous annealing on the Wean line enables J&L to fill tin plate orders far more quickly than was possible with the slower batch annealing process. And the Wean line gives uniformly annealed strip for higher quality finished output.

Operating at speeds up to 2,000 fpm, the line can handle 50,000 lb. coils with a maximum O.D. of 85". Accurate *zoned* tension control is maintained by passing the strip through six, electrically-interlocked, precision bridles. A unique system for removing heavy-end scrap utilizes two uncoilers which may be shifted laterally to permit winding the heavy ends on a scrap reel located outside of the line.

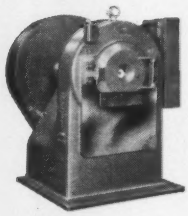
Wean "creative engineering" has accounted for much of the development work that has established continuous annealing as a standard processing operation in the steel industry. The Wean Engineering Company pioneered in this field and has built more continuous annealing lines than all other manufacturers combined. This experience is ready to serve you.

THE WEAN ENGINEERING COMPANY, INC. · WARREN, OHIO

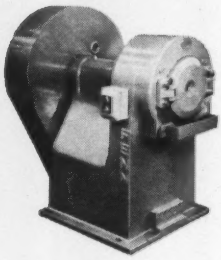
ARE YOU MACHINING WHEN YOU SHOULD BE SWAGING?



Rotary Two-Die

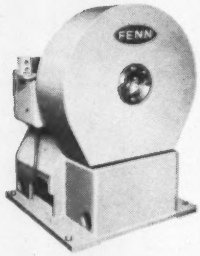


Rotary Four-Die

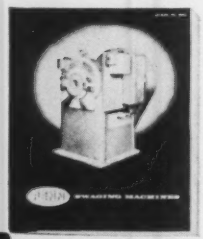


Long Die

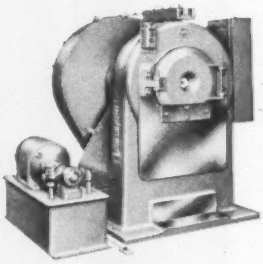
Cost conscious manufacturers are finding it extremely profitable to design the components of new products . . . or redesign old ones . . . for production on Fenn swaging machines. What's more, in many cases swaging makes it better. On the *money saving* side, here are important considerations. Low investments in both machines and dies, the absence of chips with resulting savings in both metal and chip handling, lower labor costs because highly skilled operators are not required, and savings in time . . . for swaging is simple in operation, whether manually or mechanically fed. On *making it better*, swaging improves the physical characteristics of the metal, imparts a high finish, maintains continuous accuracy to within $\pm .001''$, and performs many operations possible by no other method. Your nearest Fenn sales engineer can competently advise you on possible application to your product.



Stationary Die

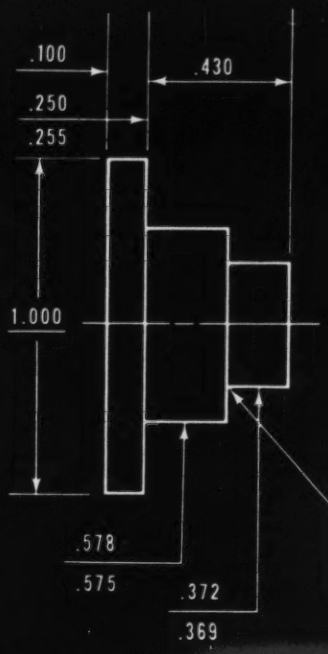


For complete guide to rotary swaging and technical data on the Fenn line, write for Catalog SM-60. The Fenn Manufacturing Company, Fenn Road, Newington, Connecticut.



Hydroformer

Only **FENN** *makes all types of swaging machines*



inside corners

SHARP AS POSSIBLE

KEYSTONE WIRE

flowability does it!

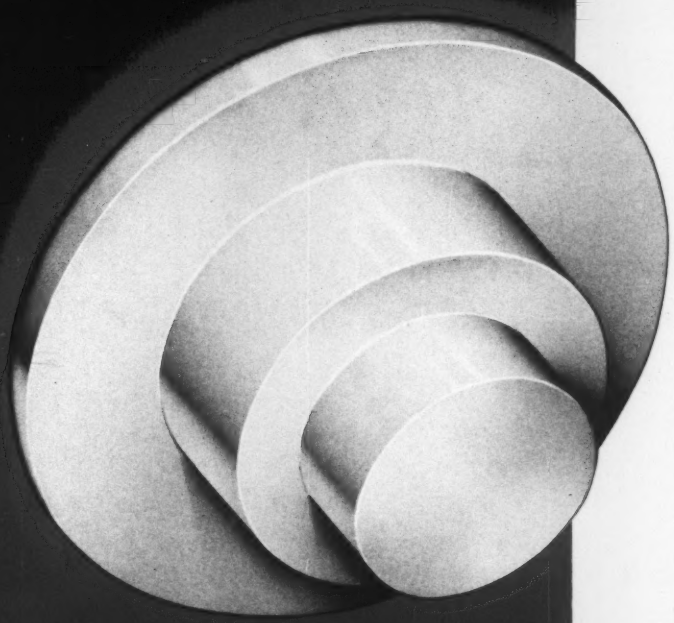
"Inside shoulders as sharp as possible," read the specifications for this shoulder rivet used in an automobile door assembly.

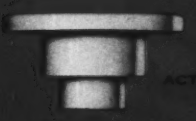
"Rockford"® Screw Products Co., Rockford, Illinois, makes this part from Keystone Direct Drawn Heading Quality Wire. In three blows, original .488″ diameter wire is extruded to .379″ diameter and severely upset to 1″ diameter. The head is consistently formed without cracking while holding to head diameter tolerances of ±.010″.

This special part, now made exclusively from Keystone Wire, is the result of extensive wire study. The flowability of this Keystone Wire allows the metal to completely fill the closed dies and achieve these sharp inside corners. Correct chemical analysis and closely controlled finish add to the successful cold heading of this shoulder rivet.

Our trained metallurgists and technicians are available to help solve your wire problems. Send us your specifications and we shall recommend the best steel analysis for you.

Keystone Steel & Wire Company, Peoria, Illinois





KEYSTONE

WIRE FOR INDUSTRY

MADE AT PEORIA, ILLINOIS, U.S.A.

Large beryllium pressings for nuclear and missile applications produced for General Electric Company.

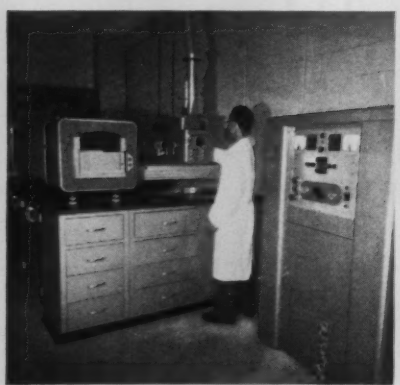
BERYLCO-Setting the Pace in Beryllium by Putting Proven Research Principles into Production

BERYLCO's consistent research leadership is simplifying the transition from laboratory to production line for aircraft and missile makers using beryllium. Chemical and spectrographic analysis, physical and mechanical property research, and pilot plant studies help produce rigid quality control procedures as well as a constant source of new testing data. BERYLCO can also supply an experienced staff of field and plant technicians to assist you in your own product development, or product re-design, with beryllium. Call them in when you first start thinking about the advantages beryllium can add to your product's performance. Their ideas may help you eliminate some of those time-consuming steps between testing and production.

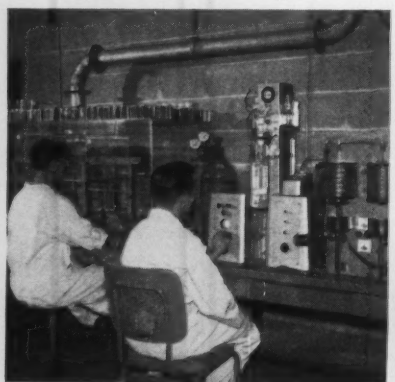
BERYLCO®

THE BERYLLIUM CORPORATION

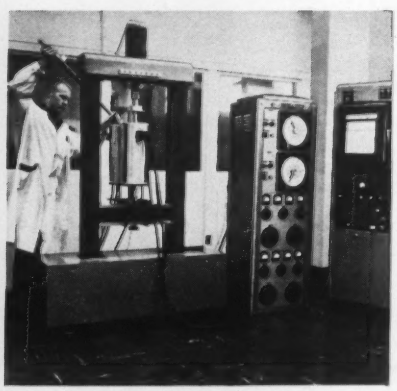
Reading, Pennsylvania



Spectrographic analysis of BERLYCO beryllium is important in controlling quality and assuring proper composition.



Conductormetric carbon determination equipment is used to assure that both BERYLCO's and government specifications are met.



High temperature beryllium research is another segment of BERYLCO service that can speed your product development.

Metalworking Newsfront 6

MARKET PRESSURES have brought a demand for flexibility in bar and structural mills, says a builder of steel mill equipment. Under today's conditions, he says, it is not desirable to have parallel lines, each designed to handle large tonnages of identical shapes. The modern mill must be able to turn out a great variety of shapes in small quantities.

THE CONSUMER DURABLES MARKET is set for a comeback, says a report of the Foundation for Research in Human Behaviour. A forecast of 2 to 3 pct yearly sales gain is based on a growing rate of household formations. In 1955, sales leveled after years of 8 pct annual rises. This reflected a decline in family formations from 1.5 million a year in 1940 to 770,000 in 1960.

NEW CONSTRUCTION SPENDING is expected to hit a record $57.8 billion this year, according to the Commerce Dept. Private construction outlays will total $40.3 billion; public, $17.5 billion.

RAIL FREIGHT CARS ARE BADLY NEEDED by the nation's railroads. But, so far at least, the roads' are not buying. Everett Hutchinson, ICC chairman, joins the American Railway Car Institute in terming the shortage, "critical." The institute reports that freight cars are being scrapped faster than they are being built, and 10 pct of existing cars are "unfit."

"HANDYMAN" PRODUCTS AND TOOLS represent a bigger market than generally believed. A Census Bureau survey shows handymen spent $2.9 billion last year on home improvement jobs, 22 pct of the $13.1 billion national total. Handyman spending is understated. Do-it-yourself outlays include only material costs. Tool spending comes on top of that figure.

THE INDEX OF THE AMERICAN GEAR MANUFACTURERS ASSN. shows a 21.3 pct decrease in May from April. The May index was 193.7 (1947-49 = 100) for new bookings. This is below the 1960 average of 235.5. May shipments index hit 239.1, up from 233.9 in April.

MORTGAGE LENDERS ARE BALKING at loaning funds at the lowered FHA interest rates. This is pointed out by E. J. Burke, Jr., president of the National Assn. of Home Builders. He says this will stifle home building. He is asking for government action to see that "mortgage lenders respond favorably."

73% of first field reports indicate REX® 49 outperforms other high speed steels

Here are some typical comments...

NEW YORK--TURNING HEAT TREATED 4140--REX 49 SHOWED LONGER LIFE THAN T-1, T-4 AND T-15.

CLEVELAND--TURNING 4140 AT 300 BHN--REX 49 60 PER CENT LONGER LIFE THAN T-15.

WATERBURY--FACING STANDARD DIE BLOCK MATERIAL AT RC 35--REX 49 LASTED LONGER THAN T-15 AND CAST COBALT ALLOY.

EAST HARTFORD--TURNING TITANIUM C-120AV, 1200 RPM, .020" FEED, 1/32" DEPTH--REX 49 OUTPERFORMED T-5.

CLEVELAND--CUT-OFF TOOL CUTTING $\frac{3}{4}$" SQ. T-431 STAINLESS--REX 49 CUT 50-60 PIECES BEFORE RESHARPENING. T-4, T-5, T-8 AND T-15 CUT 10-15 PIECES BEFORE RESHARPENING.

CHICAGO--REX 49 RUNNING 80 PER CENT LONGER BETWEEN SHARPENING FOR TURNING NICKEL SILVER ALLOY AND 50 PER CENT LONGER FOR TURNING MAGNETIC IRON THAN T-2.

NEW YORK--TURNING HIGH NICKEL ALLOY--REX 49 OUTPERFORMED T-15.

REX 49 is readily available from local Crucible steel centers. Call the Crucible technical service engineer nearest to you to find how you can benefit with REX 49. *Crucible Steel Company of America, Dept. HG06, Four Gateway Center, P. O. Box 88, Pittsburgh 30, Pennsylvania.*

CRUCIBLE STEEL COMPANY OF AMERICA

Government Controls Threaten Business Outlook for '62

The President's advisors are control-minded if anything like a national emergency develops.

But if controls are not placed on business, a record production level is likely to follow.
By Tom Campbell

■ Two serious factors could affect the business picture before early next year. Controls based on limited war or controls based on limited mobilization. Limited war is a possibility; limited mobilization is more of a probability.

But if neither of these occur, then the course of business after Labor Day will be sharply upward. The two mainstays will be steel and autos.

First, a Summer Letdown—Before the upward trend is resumed, there will be the summer slump. But this year it will be short-lived, at least as far as durable goods business is concerned.

Just when the business spiral is sharply on its way up by early next year, government spending will be adding its fuel. It is then when the danger of clampdowns and wage-price controls may be the greatest.

But just as this uptrend means sharp reversal of the mild—for some—recession, so does it mean that it won't be long before we will be worrying about a new downtrend.

Government Finances—One thing this recovery has in common with the last one: It will feed on a big deficit. And that deficit may be in the area of $12 billion, same as happened in fiscal 1959.

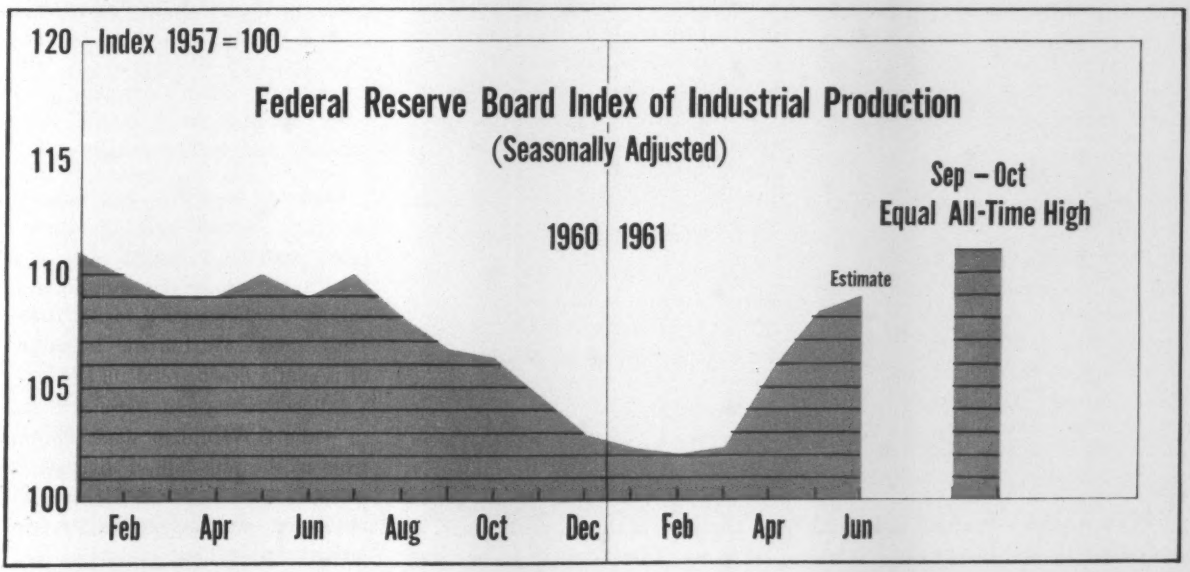
Then, as now, we were told that there would be a surplus. Then, as now, it looked as if the real support was from everyday business when, in fact, the recovery was due partly to deficit spending.

There is also one major difference between this recovery and the one in 1958. Then there were price increases; now there is a whole slew of price decreases. This means lower profit, less spending by boards of directors at a later date, and lower revenues for the U. S. Treasury.

Production Record—But from a production standpoint, the Federal Reserve Board's Index of Industrial Production will reach its last record of 111 certainly by October or November (see chart) and go to a new all-time record by May or June of next year.

Again much of this strength will be due to steel and autos—and the

Production: A New High This Fall?



A New Climate for Labor Talks

The big labor negotiations (automotive this year, steel next year) will take place in a new climate where the influence of President Kennedy and Sec. of Labor Goldberg will be felt.

The feeling is growing that despite Administration assurance it will not interfere in labor disputes, this is a mere case of semantics.

Tip-Off in Detroit — How the auto negotiations are handled by Kennedy-Goldberg will be a dry run for the stalemate that is almost sure to come up in 1962 in steel labor.

By the time the steel labor contract runs out, the seriousness of the international situation will have reached the entire nation. If there is limited mobilization by that time, the Administration will insist both sides get to work and settle quickly without a strike.

The Possibilities — Best guess: The Steel Labor-Management Follies will play in the same vein as always. But next year management will be more determined not to yield and the union will be more on the defensive. The Government will get into the act faster than ever before.

Result: A much shorter strike than in 1959.

support both of these industries give to mining, manufacturing equipment, clay and glass products, fabrics, and all other lines stimulated by steel and automotive action.

Steel Outlook—But all this activity will be pretty much of a frustration to many manufacturing companies. Steel profits will vary among companies. This is due to product mix. Sheets, strip, and bars have had a big time—and will have a bigger time. But pipe, structurals, and wire have had a much harder time. Thus, producers heavy on the less active items—compared to flat-rolled—will make lower profit. Also, pipe makers and those who thought they were making concrete bars will be affected because of price cuts.

Specialty steels such as stainless will pick up substantially in output, but the price angle is a depressant on the profit outlook. But much of this will change later as production, backlogs, and more profitable rolling schedules become common. Whether stainless can mount a price increase later to wash out the recent price cuts is something that will have to await results of an attempt to boost prices.

Price Angles—Stainless is locked in battle with substitutes and foreign imports complicated by large capacity. These factors are strong reasons for viewing with caution a free-wheeling price increase. Much has been made of the simple approach that once the steel market looks better—and acts better—there will be no trouble upping the price. The big question there: "Who will step out and run the chance of losing a hunk of business to his domestic competitor?" Answer to date: "No one."

But taking all the good with the bad, there will be strong improvement on steel, aluminum, plastics, railroad buying, oil and gas activity, auto production, machine tool sales, and new plant and equipment spending. The big push will start late this year. But, curiously enough, there is no sign of inflation or a rash of price increases. Some made recently may not stick.

Looking Ahead—The steel industry ought to make steel at about 65 pct of capacity in the third quarter and average about 75 pct in the fourth quarter. If there is an auto strike (chances are 50-50), that means a postponement of some steel buying for autos. But it will come in sooner or later.

The big push in steel starts in February. Then it ought to be clear that there is no assurance whatsoever that we will get by in 1962 without a steel strike. Even if there isn't to be one because of government intervention, most steel consumers cannot take the chance.

After the Deadline—So look for this next year: A rush of steel buying (and aluminum buying) up to the end of June 1962. A quick Taft-Hartley move is not likely because most steel customers will have lots of steel by that time. If there is a strike, steel output will be down, of course; if there isn't, output will drop because of heavy inventories built up as strike hedging.

Now to the specter of controls. The Administration denies such a thing. But it is know that the boys in the back room are all set to jam them in when and if Mr. Kennedy sounds the alarm. Pressure on steel prices by the government now is a sure sign that control thinking is widespread among Mr. Kennedy's advisors.

Summing Up—Next year looks like a 6 million domestic car year. Railroad buying is bound to show up in 1962—it always does when steel becomes difficult to get. And it will be hard to get come next March and April.

Installment buying will be on its way up sharply late this year or early next year. This means more cars, appliances, new homes, and general buying. The home building bill with its 35-40 years to pay, with a pittance down payment, will bring applications into the home building picture late this year.

Outlook to 1963—So, momentum for 1962 will build up late this year, push to a record early next year, coast along the summit next summer, balance itself in the fall of 1962, and fade for the beginning of a gentle down trend in 1963.

All bets are off if there is a war or if the Government slaps on controls in the late fall of this year—or early next February. It depends on Berlin, so bone up on your international reading.

Is Buyers' Market Fading?

One Expert Looks for Prices to Climb Soon

Many commodity prices could move up decisively by the end of the year.

This is what J. R. Rice, vice president of procurement, Koppers Co., Inc., says in an interview with The IRON AGE.
By G. J. McManus

■ Jack Rice is pushing engineers to nail down plans for the steel mill Koppers Co., Inc., is building for Turkish interests.

Vice president and director of procurement at Koppers, J. R. Rice is placing equipment orders as rapidly as possible. He feels the buyers' market has passed its peak. He believes prices could move up decisively over the next six months.

"I have a feeling the turning point has been reached on structural fabrication, machinery and other items where prices were too low. It's just a question of how long it takes sales managers to catch up with the change."

Mr. Rice does not go along with the theory that plentiful supply and weak prices are here to stay. He admits the recovery has been moving slowly. From a supply standpoint, the tightening so far has little concrete evidence.

The Rush — Nevertheless, he is sure the same old rush is going to develop one of these days.

"It's happened before. We'll be back in a period of shortage again."

Mr. Rice points out, moreover, that prices in many lines are squeezed down tight, ready to rebound.

"We know we're buying a lot of items too low," he says.

Violent Swing — He cites structural fabrication as an area where the price swing has been violent on the downside and figures to move up with the same force. From the low point in a recession to the high point in a boom, he says, prices of structural work can jump as much as $100 a ton. He sees signs that the upswing may be developing: There is still price cutting but the cuts are not quite so deep.

These thoughts are evidently not shared by purchasing men generally. The June survey of the National Assn. of Purchasing Agents shows inventory liquidation was still going on.

Nevertheless, the views of Mr. Rice cannot be taken lightly. The Koppers purchasing operation reaches into a wide range of markets. Dealing with long lead times, it works under heavy pressure to detect supply changes as they occur.

Big Spenders — Last year Koppers spent more than $180 million for materials and services. About 80 pct of this was bought by purchasing groups serving the complete needs of various divisions. Distinct buying units are assigned to tar products, chemical, plastics and wood preserving divisions.

The remaining 20 pct of the buying load is accounted for by the engineering and construction division. Koppers builds coke ovens, blast furnaces, openhearths and complete steel mills. Buying for this activity is done along commodity lines. Mechanical equipment, castings, pipes, valves, fabricated steel, refractories and others are broken down into five groups.

Divergent Trends — With this kind of variety, Mr. Rice must gear his thinking to widely divergent supply trends.

At the moment, however, he sees most markets moving toward firmness. He is not so much concerned with the products that move up with labor rate changes. The real action, he feels, will come with more volatile commodities that jump up and down as demand changes.

JACK RICE: "Now is the time to stock up. Prices will climb."

Ferroalloy Makers Sell Service

Fast Delivery, Packaging Make Hit With Buyers

Even though their market is largely tied to steel and fixed product specs, ferroalloy makers find ways to compete.

They build sales by speeding shipments to users, packaging for handling ease, better products, and customer service.

By F. J. Starin

■ Ferroalloy makers are keeping their sales weapons sharp. Each producer's main aim is enlarging his market. And because about 85 pct of this business is with the steel industry that's the sales area getting the most attention. The hunt for new markets must take a back seat.

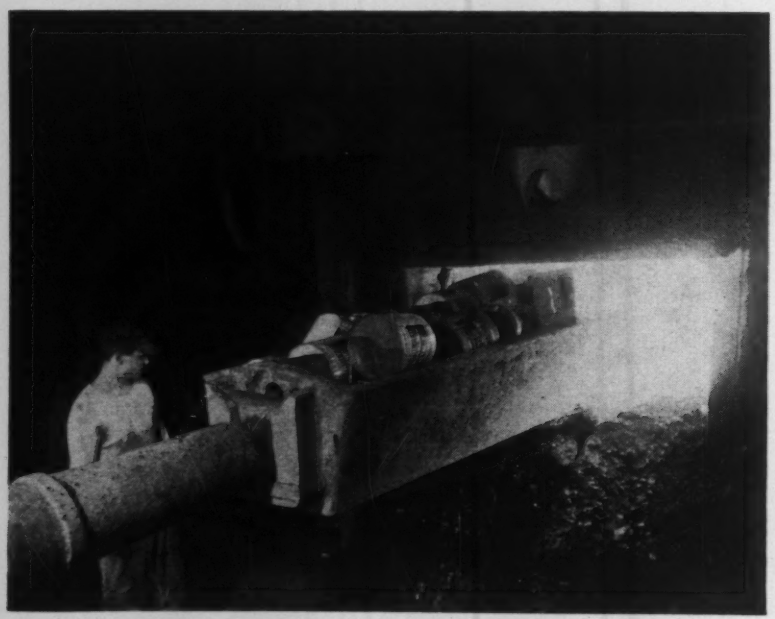
A ferroalloy is, simply, an alloy added to steel, or other metal, to improve specific characteristics. So new product development is rigidly restricted by the specifications of the various metals.

Also, there is definite overcapacity in the domestic industry. And a pinch of foreign competition keeps a heavy downward pressure on price.

Service Stressed—With such limitations, what can a ferroalloy maker do to boost sales. Several of the major companies in the field have found new ways of competing. And most of these come under the general heading of service.

One of the areas under constant attack is the cost to steelmakers of inventories and handling. As a result delivery of ferroalloys is now measured in hours rather than days. All of the ferroalloy makers have expanded their chain of distribution centers so these outlets are close to every major steelmaker.

A spokesman for Union Carbide Metals Co., largest in the field, reports one stainless steel maker maintained less than a day's inventory through much of last year. How was this possible?



READY FOR USE: For handling ease, ferroalloy makers supply products in cans for ready feeding into the furnace or ladle.

Right to the Scene—The company has been storing its ferroalloys on the ground floor, with a railed conveyor to the second floor where they are charged. UC filled in between the ties of the conveyor and now drives its delivery truck right up to the second floor and dumps the ferroalloys right into the charging boxes. And, just to allow for mechanical trouble on the truck, UC keeps a standby truck loaded and ready to go.

There are some cases when steelmakers have the charging boxes to spare, where ferroalloy makers actually deliver the product in the charging boxes ready for the furnace.

In another case UC has the ferroalloy delivered to a steelmaker in a special twelve compartment truck. Each compartment contains a precisely measured charge. The steel company gets the economy of bulk with no weighing and little handling.

Packaging Important — The day of the melter with a pile of ferroalloy, shovel, and scales is really over. More and more ferroalloys are being delivered, bagged or canned, or for larger quantities in disposable pallet boxes.

Union Carbide says it introduced bags in 1957 for evaluation. Now a very wide range of materials, including all grades of ferrosilicon, standard and medium carbon ferromanganese, silicomaganese, calciumsilicon, ferrovanadium, ferrocolumbium are bagged.

The company says some of the advantages include: better recoveries since fines are not lost, more efficient handling, heats are more easily diverted to different specifications just before tapping.

Product Improvement—It would be a mistake to think that the ferroalloy producers have done nothing to improve their product. A spokes-

man for Vanadium Corp. notes quality as the main area in which the company seeks a competitive advantage.

The aim: Getting rid of contaminants in the ferroalloys. The approaches: More careful selection and grading of ores, and vacuum refining.

A case in point on vacuum refining, says a Union Carbide spokesman, is low carbon ferrochrome. "Added during the reduction or finishing periods of a stainless steel heat, it should introduce a minimum of carbon in order not to exceed the carbon specifications of stainless steel. With vacuum processing a low carbon ferrochrome can be produced with a maximum of 0.01 pct carbon."

Technical Studies—A spokesman for Vanadium Corp. says his company is paying very close attention to the growth of oxygen steelmaking. They are trying to devise better combinations of materials at lower prices, specifically for oxygen furnaces. This is very likely, he notes, since the speeded up operations burn out unwanted contaminants more easily than openhearths.

Another problem being attacked technically by ferroalloy makers is getting a more uniform mixture of ferroalloys in the molten steel. It's sort of like a cup of coffee. It's difficult to get all the sugar to dissolve without dipping in a spoon and stirring.

Added Ingredients—One answer is exothermic alloys, a combination of the ferroalloy, an oxidizer and a reducer. The added ingredients are in exact proportions to cancel each other. But they create a turbulence in the molten metal in the ladle and promote higher and more uniform recovery of the ferroalloy.

Self-reducing alloys are for furnace additions such as tungsten and vanadium, which tend to segregate at the bottom of the furnace. The built-in reducing agent improves the mixing.

These carefully balanced mechanical mixtures are usually packed in color-coded cans which can be fed unopened into the furnace or ladle.

Defense Buying Still Under Fire

Military procurement methods are slowly changing. But many Congressmen feel the change is a little too slow.

The Pentagon will probably have another year to produce a better system.
By R. W. Crosby

■ Defense Dept. procurement methods are slowly changing under the harrowing critical fire of Congress and government auditors. The Pentagon is formulating several new approaches to military buying which will affect contractors.

The plans, however, still have to be implemented. Meanwhile Congress keeps firing away. And in some of the fire, direct action can be seen.

What the Pentagon plans to do is mostly on the policy level. Thomas D. Morris, assistant Defense Secretary, says the Defense Dept. is conducting a vigorous effort to open more military contracts to competitive bids. "If we can succeed," he says, "we will capture savings of tens of millions of dollars."

New Plans—Pentagon plans for new procurement procedure are growing fast and furious. They include:

(1) A new planning procedure to determine the true, total cost of any new program before it is undertaken. The value can be weighed against the probable cost.

(2) Defense Dept. moves to force the Army, Navy and Air Force to set up single managers to buy military supplies used by the services. Four new single manager buying units are proposed to cover purchase of general military supplies, automotive supplies, industrial supplies, and construction equipment and supplies.

(3) Working military task forces trying to find items which can be bought through competitive bidding rather than by negotiated contracts. The Army, for instance, says it can raise competitive bidding on spare parts and other items three pct each month. Navy says it is opening a number of aircraft spare parts orders to bids for the first time.

(4) Efforts to work out a practical, acceptable system for rewarding good cost performance by military contractors through greater profit incentives, while penalizing substandard performance through reduction in profits or fees.

Good Ideas — Congressmen say the ideas behind the plans are fine. But they put the Pentagon on notice to prove the predicted savings can be made by next year or face the consequences.

Reporting on the $43 billion defense money bill, a House committee again found "shocking examples" of waste and inefficiency in the Pentagon. While commending Defense Secretary Robert S. McNamara for his "vigorous" approach to procurement problems, the committee gave him 12 months to straighten up his procurement house or face Congressional action to impose corrections.

Senate Critics—Criticism from the Senate is in the same tone. Sen. Paul Douglas, (D., Ill.), chairman of a Senate Procurement Subcommittee urges increasing the total of competitive bid contracts from 13 or 14 pct to a total of 20 pct.

Sen. William Proxmire, (D., Wis.), sums is up this way. "I do once again want to commend you (the Defense Dept.) for moving in the right direction, although I am unhappy about the fact that we seem to be making such minor inroads."

INDUSTRIAL BRIEFS

Heating Choice—H. E. Ziel was elected chairman of the air conditioning in industry committee of the American Society of Heating, Refrigerating and Air Conditioning Engineers at the annual convention.

Scientific Group — A. B. Billet was elected president of the Institute of Environmental Sciences at the annual meeting. He is senior staff engineer, Vickers, Inc.

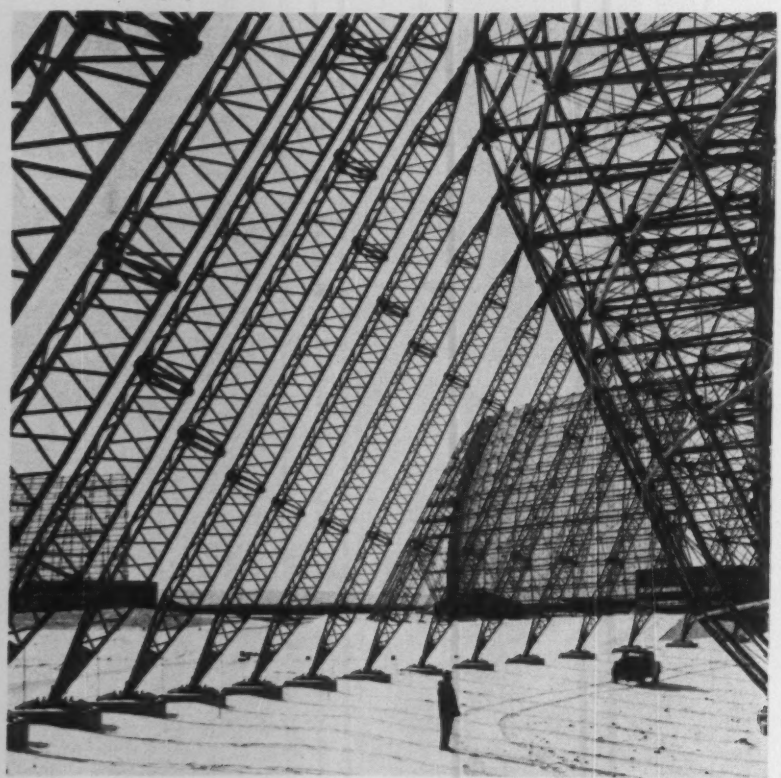
Pipe Supplier—National Supply Div., Armco Steel Corp., has awarded the entire furnace equipment needed for its new combination pipe mill to Selas Corp. of America. The Ambridge, Pa., plant will turn out a wide range of electric resistance welded pipe.

Steel Sale—Idaho Maryland Industries, Inc., Los Angeles, has purchased Denver Steel & Iron Works Co., for $300,000. It will operate as a division of IMI at Denver.

Kaiser Growth—A new five-stand tandem cold rolling mill is being installed at Kaiser Aluminum & Chemical Corp.'s Ravenswood, Va., Works. It will assure maximum thickness and flatness control for light gage aluminum sheet products.

New Section—Interstate Steel Co. has formed a new work-order department to fabricate steel. It is part of the expansion program accompanying the opening of Interstate's new headquarters building at Des Plaines, Ill.

Steel-Supported Sentinel Guards North



KING SIZE RADAR: High steel latticework supporting 900-ton radar antenna reflectors at USAF Ballistic Missile Early Warning Station at Clear, Alaska, dwarfs technician. General Electric Co. is building the radar system.

Another Line — Tuthill Pump Co., Chicago, has purchased Ossian Engineering Co., Inc., Fort Wayne, Ind. Ossian will continue to make hand and electric gasoline pumps.

Big Order—Birdsboro Corp. has started delivery of plate handling equipment for Alan Wood Steel Co.'s new 110-in. rolling mill at Conshohocken, Pa. The $3 million order includes this country's first disc type cooling bed, 90 ft wide by 114 ft long.

Elox Gets—Elox Corp. of Michigan has purchased Method X Div., Firth Sterling, Inc. Both companies design electrical discharge machining units.

Automatic Mill — Westinghouse Electric Corp. has installed a 134-in. reversing universal plate mill at Republic Steel Corp.'s Gadsden, Ala., Works. It is the first mill in the industry to combine in-line process computer control with punched card programming.

Washing System—Chemical Construction Corp., New York, is installing venturi washing systems on four blast furnaces at the Colorado Fuel & Iron Corp. steel plant at Pueblo, Colo.

Ferry Expands—Ferry Cap & Set Screw Co., Cleveland, has acquired Baldwin Manufacturing Co., Toledo. Baldwin will continue to design and manufacture precision sheet metal parts and assemblies for the electric, electronic, and aircraft industries.

Oxygen Aid—Hydrocarbon Research, Inc., New York, is building a $6.5 million oxygen plant. It will produce and supply oxygen and high-purity nitrogen to Tenneco Chemical Co., Houston, for its new petro-chemical complex at Pasadena, Tex. Output will be 730 tons per day.

New Division—Duer Spring & Manufacturing Co., McKees Rocks, Pa., is now a division of Standard Steel Specialty Co., Beaver Falls, Pa. Duer makes precision mechanical springs by both the hot and cold coiling methods.

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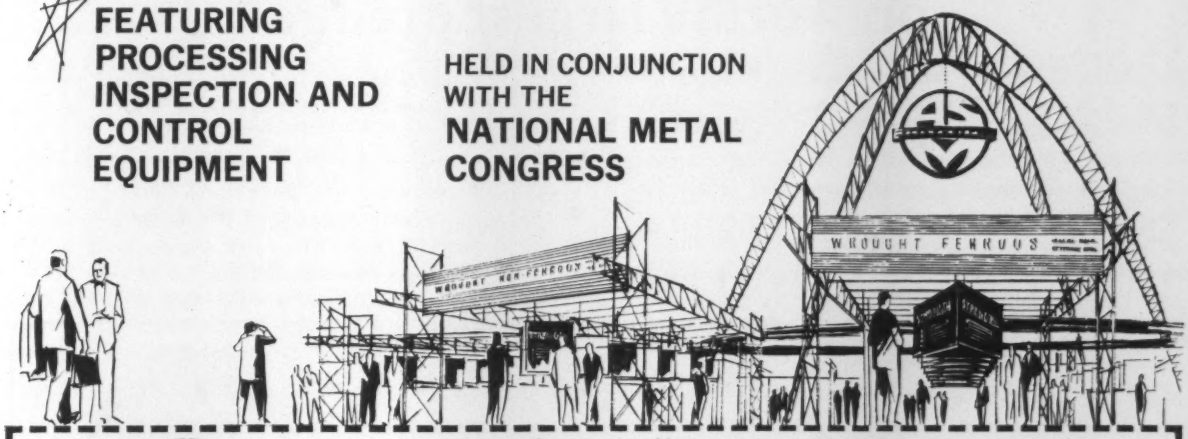

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ASM Headquarters, Metals Park, Ohio

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(Enclose check or money order) TOTAL

Company _____

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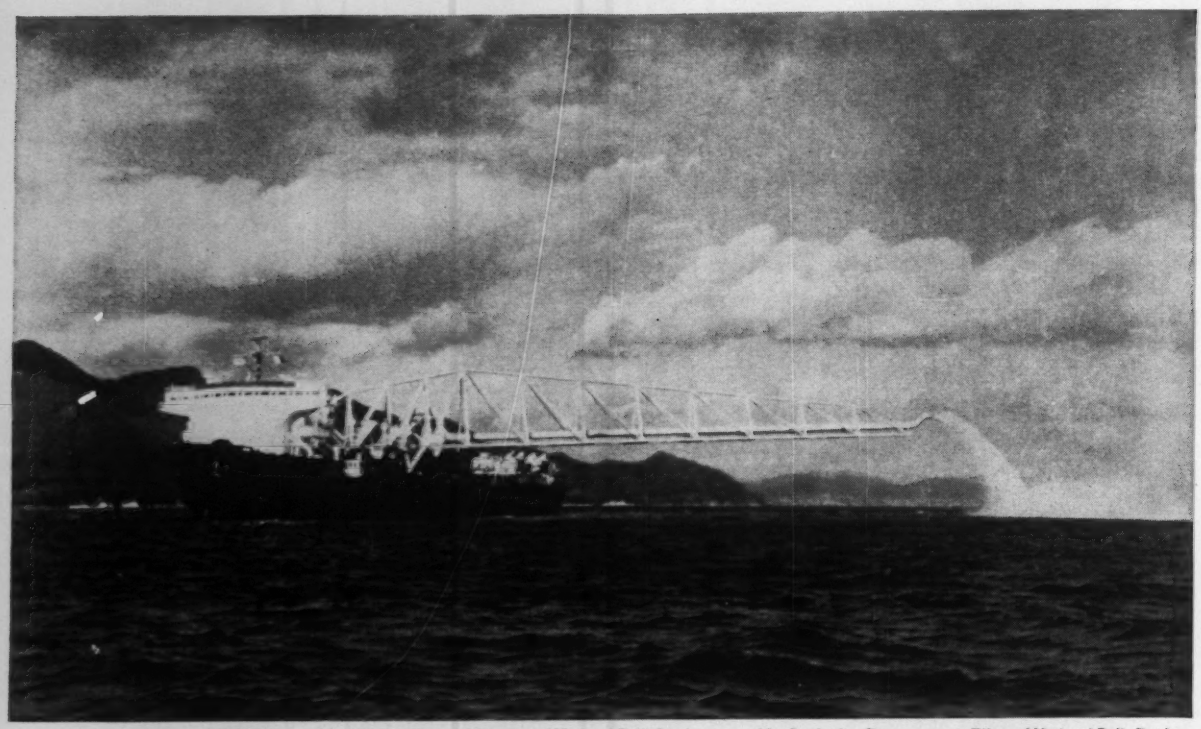
*No registration fee for ASM Sessions and exposition for members of ASM, AIME and SNT.



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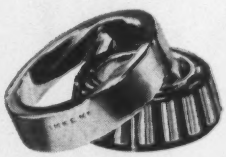
HELPING KEEP TIMKEN BEARINGS YOUR NO. 1 BEARING VALUE is this huge dynamometer in our physical laboratory. It's typical of test equipment we use to assure long life and minimum maintenance in Timken bearings.



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Managing Research for Results

If properly planned and used, industrial research will help your company get—and keep—competitive advantages.

But careful management of research programs is needed. Here are suggestions on what to do and what to avoid.

■ Few business weapons are more vital than sound industrial research. Properly developed and used such research aids a company's growth. It can even keep a company alive.

But research is a two-edged weapon. If not carefully directed the results can be disappointing—or disastrous.

The Manager's Role — This is where management comes in. For maximum benefit, research must be aimed at solving the right problems. It must be tied in with the company's long-range plans and objectives.

Horizons, Inc., a Cleveland company providing research services for industry and government, has analyzed the areas of research and the ways to make it effective.

Generally, Horizons points out, research programs are directed at developing and improving products, developing and improving processes, diversifying, and reducing production costs. Research is widely used to get and keep a competitive position or advantage.

Approach Important—Management's duty is to recognize these problems, plan research to maintain competitive advantage, and furnish the direction and facilities for growth.

The best research approach uses objective observation, logical reasoning, and appropriate tests.

What are the pitfalls to avoid in planning research programs? These are singled out: No research should be started that yields results the company is not in a position to use. The same applies when the company is unwilling or unable to supply the capital needed to exploit research results.

Sound Basis Needed—Research should have good technical reasons for expecting it to be successful. This means a program with a sound basis in terms of business, management, and technology.

Research must be long-range in nature. Research for diversification is practical, but this requires a daring management.

Since every industry and every company has its own specific and peculiar problems, research must be tailored to the organization it serves.

Summing up, research will be profitable if it has the proper objectives, proper guidance, proper scale, and is sustained in scope.

Which Are Largest Companies?

■ Research helps a company stay on top. It's also a factor in keeping up with the times and meeting changing market needs.

This is reflected in the latest list of the 100 largest companies in the U. S., as compiled by the First National City Bank of New York. In the past ten years 20 new companies have joined the top 100, replacing an equal number who dropped out.

The Newcomers — Among the newcomers are 12 manufacturers, most in such fields as electronics and business machines, aluminum, chemicals, and petroleum. The other eight new arrivals are in the utilities group, including electric power companies, gas pipeline companies, and gas distributors.

Three of the new companies entered the big 100 by way of mergers. One railroad fell out of the group in the ten-year span, but reentered after merging with another railroad.

How They Qualify — Membership in the top 100 isn't easy to come by. To qualify in 1960, a company needed minimum total assets of $698 million, more than double the amount needed in 1950.

Among manufacturing companies the 100 largest (based on total assets) includes: Standard Oil Co. (N. J.), $10.0 billion; General Motors Corp., $8.5 billion; U. S. Steel Corp., $4.7 billion; Ford Motor Co., $4.0 billion; Gulf Oil Corp., $3.8 billion; Texaco, $3.6 billion; Socony Mobil Oil Corp., $3.4 billion; E. I. duPont de Nemours, $3.1 billion; Standard Oil Co. (Ind), $2.9 billion; Standard Oil Co. of Calif., $2.7 billion; General Electric Co., $2.5 billion; Bethlehem Steel Co., $2.2 billion.

Modern board forging hammer

DEPENDABILITY of shifter fork improved by designing it to be FORGED

By designing the shifter fork of his transmission to be forged, a manufacturer of earthmovers eliminated costly equipment breakdowns in the field because of fork failure. Factor of safety was *in*creased even while weight and over-all costs were being *de*creased.

Parts scrapped because of voids uncovered after much high-cost machining are eliminated . . . forgings are *naturally* sound all the way through. Forgings start as *better* metal . . . are further *improved* by the compacting hammer-blows or high-pressure of the forging process.

Design your parts to be forged . . . increase strength/weight ratio, reduce as-assembled cost, improve performance. Literature to help you design, specify, and procure forged parts is available on request.

When it's a vital part, design it to be FORGED

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Names of sponsoring companies on request to this magazine

RESISTANCE: Unions will fight to the bitter end on principle to protect even the most irresponsible and troublesome of their members.

How to Improve Productivity; Why Some Attempts Fail

By **R. N. McMurry,** President, The McMurry Co., and **J. F. Sullivan,** Labor Relations Consultant, Chicago

The first step to improve worker productivity is to understand why some approaches fail to reach the workers at all.

This is the first of a three-part series on worker productivity. It tells why some accepted methods are doomed from the start.

■ There are a lot of puzzled management men today. Their companies are streamlined, efficient. Their research labs are turning out ideas for new, salable products. Production is well-oiled with a good sampling of new tools.

But they find themselves caught in a cost-price squeeze.

Too often they find themselves underbid on competitive jobs. Or, when they bid low enough to get the business, profits either are not there or are so small management wonders if the job was worthwhile.

Root of the Problem—In many cases, a close analysis shows that labor costs are at the root of the problem. The company may be paying more than the competition in base pay or fringes. But just as often, the problem goes back to simple productivity.

Work rules, restrictions in labor

NEXT WEEK

Productivity goals cannot be achieved and sustained in a company unless management wins allegiance of the workers. In the second part of the three-part series, the authors will show how this allegiance can be won.

contracts, loss of the right to manage and to discipline, have robbed many managements of the edge on worker productivity that would show the profit and enable them to take on jobs that require close cost cutting.

Can Be Fatal—Then again, there is the personal frustration to management people who lose arbitration case after arbitration case, with an equally painful loss of face to union stewards.

Actually, many manufacturers are poised on the brink of disaster. Faced by technological changes, new and competing materials, shifts in markets, and increasing foreign competition, profits are shrinking; costs are rising.

And the big cost increase is usually that of labor. Each year, the scale and benefits go up, but productivity does not always keep pace. More and more employers find themselves in a cost squeeze that threatens to be fatal.

New Approach Needed—Admittedly, labor productivity is not the sole contributor to the dilemma, but it is a major factor in many manufacturers' desperate situations.

About the Authors

Robert N. McMurry is a leading industrial psychologist and consultant. He is the author of a previous IRON AGE series on problem employees (August 6, 13, 19, 1959). An overwhelming reader response marked this previous series.

John F. Sullivan, a member of the McMurry Co., is a practicing labor relations consultant. He is credited with many creative—and workable—ideas in labor management relations.

Stated inversely, if labor productivity could be increased, their chances of survival would be immeasurably enhanced.

Before it can be shown how productivity can be improved, it is necessary to knock loose a few well-entrenched illusions about the subject. The approaches used by most companies to improve productivity not only fail but actually further alienate workers.

Why Plans Fail—To induce their workers to improve their productivity, some employers have used various media of communication to get the "message" across. Some of the media: Letters sent by management to workers' homes, articles in company house organs, and courses in economics for workers and foremen.

The basic idea of this communication is to get the point across to workers that logically it is to their personal selfish interest to increase their individual output. They are told this will enhance their job security and earnings by keeping their employers competitive and in business. In fact, it will create more jobs because orders will not go to local and foreign competitors.

Almost without exception, these logical appeals to reason and worker self-interest are largely ineffective. Productivity remains unsatisfactory. Slowdowns, and even stoppages, plague many work groups. And unions continue to insist on inefficient and outmoded work practices, most of which are designed to "spread the work."

What little betterment in productivity does take place is the result of technological improvements made by management, rather than a consequence of increases in workers' efforts.

Worker Benefits — Stepped-up employee benefit programs with a view towards improved productivity usually fail badly. Benefits —holidays, recreational facilities, a cafeteria, insurance and retirement plans, and profit-sharing—are considered to be gratuities. These soon are taken as a matter of course.

There are several reasons why most of these benefits and logical appeals to worker self-interest fail to improve productivity.

First, all communications from management to its workers are not

SUSPICION: All communications from management to workers is suspect. This is especially true when a plea is made for more productivity.

only regarded as special pleading, and hence suspect, but are also subject to these three barriers: (1) The message may not be understood; (2) it may not be believed; and (3) it may not be considered by the workers to be in their interest.

Secondly, management and worker value systems are often widely variant, if not in actual conflict. Such values as industry, ambition, and frugality, which most managements assume as a matter of course (because these are a part of **their** value systems), may be the antithesis of those of many of their employees.

Backgrounds Vary—Many workers have had their origins in radically different and often socially disorganized environments. Some workers are of limited intelligence and schooling. Some belong to minority groups or have been raised in foreign cultures.

In the value systems of many of these people, the employers, including foremen and supervisors, are seen as exploiters and enemies of the working man. Therefore, they don't view it as wrong to soldier on the job and take advantage of the employer in every way.

The reason why these value conflicts are important to recognize is because once a person's value system has been established (usually by the time he is fifteen), it is almost totally impervious to change. Hence, it is impossible for management and the workers to communicate with each other meaningfully.

Unions—A third reason why benefits and appeals to logic fail is found in union influences on workers. Unions rarely see eye-to-eye with management in efforts to get their members to work harder. This conflicts with the union's perceived role as protectors of their members' interests.

Often, they seize on and distort management's messages to "prove" that the employer seeks to exploit his workers by asking them to produce more. Unions will fight to the bitter end on principle to protect even the most irresponsible of their members.

MISTAKE: The idea that foremen and supervisors should "counsel," but never "order" is completely unrealistic.

Still another reason for failures in productivity gains is that some workers are just plain lazy. Such employees will "goldbrick" at every opportunity. They are by nature short-sighted and not in the least concerned with long-run effects of their low productivity. Any message directed toward these employees falls on deaf ears.

Problem Employees — Also, in any work group there exists a lunatic fringe of malcontents. These are emotionally and militantly anti-authoritarian employees, the "men who hate."

Such persons take delight in harassing supervision and management in every possible way. From this group of problem employees come most of the chronic grievers and trouble-makers. They are the leaders of most slow-downs and work stoppages. To attempt to influence such persons by logic is futile. Their minds are made up already.

Lastly, while problem employees may be small in numbers, their influence on the work group is often great. This is because of the desperate need of most workers to "keep out of trouble" at any cost. They may understand, believe, and accept the company's message and desire to increase their own productivity. But they fear to do so.

"Cowed" Employees — In the case of these workers, the company "message" has been received and assimilated, but they are prevented by influences beyond their control from responding as the employer wishes.

At this point it may be seen that the doctrine of the so-called "human relations approach" in industry is unrealistic. Likewise, the concept that "the boss should never give orders, only counsel," is also equally unsound.

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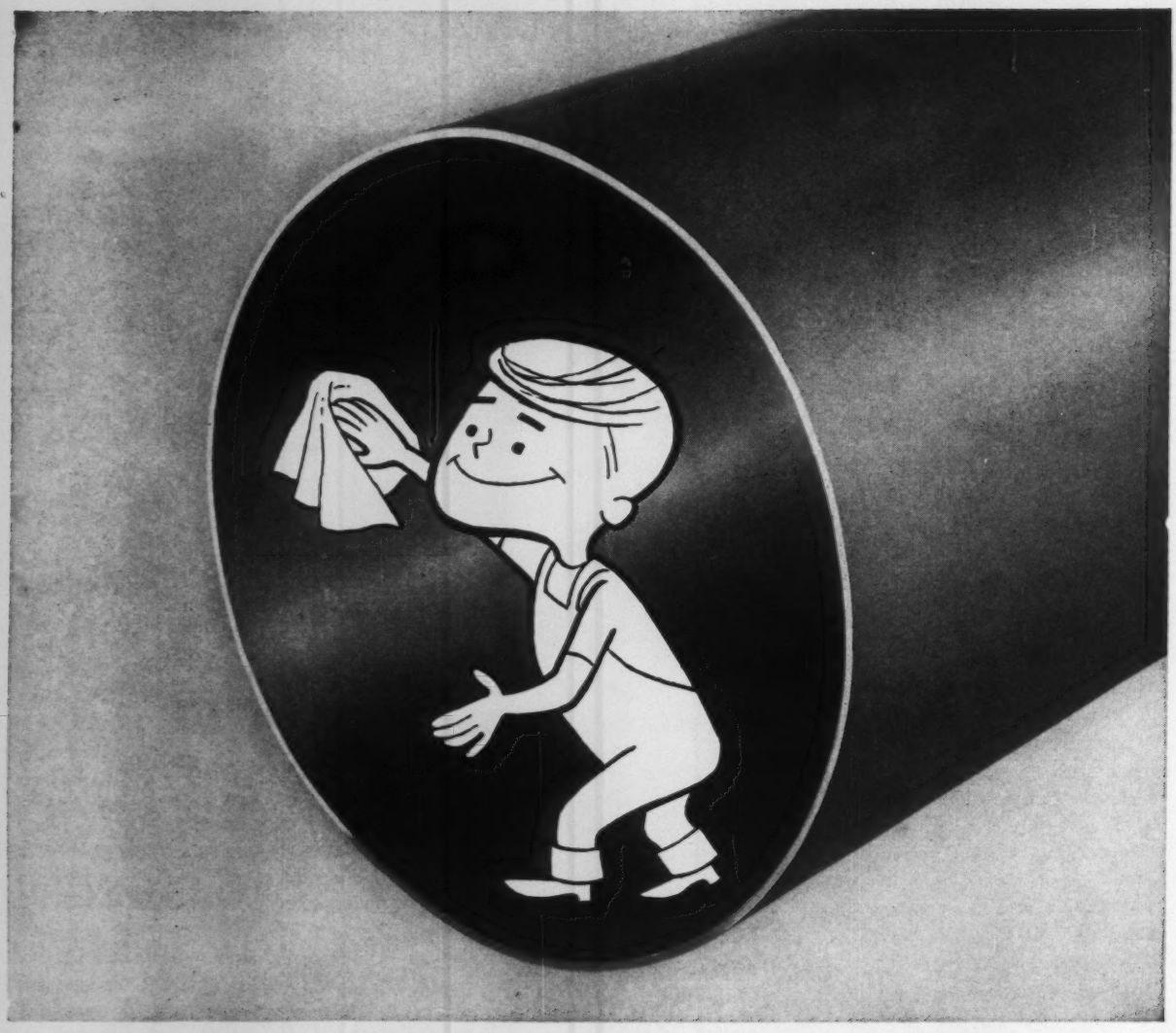

"The Gravity Kid" shows how

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In conventionally-welded tubing, gravity pulls the molten metal down into the tube, forming a bead that is difficult to remove by cold working. And cold working can lead to undercuts that become focal points for incrustation.

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* U.S. Patent 2,716,692

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What to Expect in 1962 Cars

Different Outlines of Ford, General Motors Models

Automakers are moving toward the changeover to 1962 models. What to expect from GM and Ford is outlined this week.

Next week: A look at Chrysler, American Motors, and Studebaker-Packard changes.
By H. R. Neal

■ Automakers are starting to phase-out production of 1961 models. The annual changeover is near.

What changes are coming? Here's a make-by-make rundown of what to expect in 1962 models from General Motors Corp:

Good Facelift—Chevrolet will get a good facelift with new grille, trim and taillights. Major new panel will be the roof. It will have two ribs going across, giving the appearance of a convertible. New rear sheet-metal will result in less overhang. This will shorten the car by three in. to 206 in. overall.

The new, shorter - wheelbase Chevy will have an in-line four-cylinder cast iron engine as standard. A 6 and V-8 are options. Styling is rather plain with few frills, but it will have the "convertible"-styled roof of the larger Chevy. It will be 191-in. long overall, on a 110-in. wheelbase.

Bold Front—Pontiac will feature a bold front end, a characteristic of previous years. Rear treatment features crescent-shaped tail lights. The compact Tempest will get an extra shot of chrome, plus a new treatment of the split-grille theme.

Olds Fender—Buick and Oldsmobile are also getting extensive facelifts. Olds, for example, will have a straight fender line from front to rear. It will drop sharply at the rear, similar to the 1961 Pontiac, instead of the present "bullet" shape. It will have a grille effect in the rear, also, with four or six lights, depending on the model. Rear roof posts will be wider, resulting in a slightly smaller back window.

Ford Changes—These are some of the changes to expect in the Ford Motor Co. products:

The Fairlane name is going on a new series with a 115.5-in. wheelbase and an overall length of 197 in. This is about the same size as the 1950 Ford.

Falcon will be just a little plusher next year. Changes will be minor. A new grille will have a heavier appearance.

Galaxie Tops—Ford's top lines will be the Galaxie and Galaxie 500 on the 119-in. wheelbase. Overall length remains the same, about 210 in. However, this year's rounded front end will look square.

Mercury has resurrected the Meteor tag for its new shorter wheelbase model. Like the Comet and standard Mercury, it will share a body with its Ford counterpart, in this case the Fairlane.

Middle Price—The Big Mercury will be upgraded once again to the middle price field.

Lincoln will have few changes, limited to the grille and trim. When present styling was introduced for the 1961 models, the company promised that it would last for several years.

GM, Ford Switch to New Look

General Motors Corp.

Chevrolet—Standard size cars will be shortened by reducing overhang. New, shorter wheelbase series will be added. Corvair is getting a convertible.

Pontiac—Clean lines remain; compact Tempest will have more chrome and new split-grille treatment. A convertible will be added.

Buick and Oldsmobile—Both of these cars will get extensive facelifts. Wider rear roof posts will reduce size of rear window. Compact Special and F-85 will be dressed-up with trim and have a convertible.

Cadillac—Changes will be gradual. Rear fins will be less prominent, but won't be eliminated entirely.

Ford Motor Co.

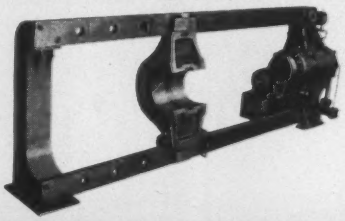
Ford—A shorter wheelbase model, the Fairlane, will be added. It will have some of the styling characteristics of the 1957-59 Fords, and unitized construction. The standard Ford will be dressed up a little more.

Mercury—Two sizes will be available. The Meteor will be an "in-between" model, sharing the Fairlane body. The standard Monterey model will be upgraded. Comet changes will not be extensive.

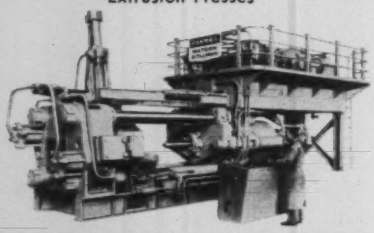
Lincoln—Changes will be minor. The grille will be new. So will the trim.

Put this variety to work–

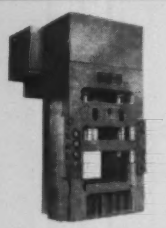
Forcing Presses



Extrusion Presses



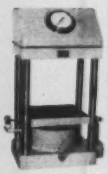
on your hydraulic machinery needs



Metalworking Presses

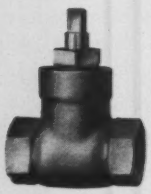
Pumps and Jacks

Accumulators

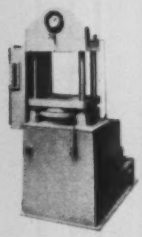


Laboratory Presses

Bending Presses



Valves



General-purpose Presses

As these illustrations suggest, it is a simple matter to meet your hydraulic equipment needs when you come to Watson-Stillman. For here is a standard line that is as broad as your requirements. And you are assured of high quality, since these designs are based on 100 years of manufacturing experience.

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Farwest Economy Still Climbs

Businessmen Look for Second-Half Gains

The outlook for the economy on the West Coast is good. Business activity has taken a turn for the better, most say.

The construction industry looks for big gains by the end of the year.

By R. R. Kay

■ Everywhere in the Farwest there are signs that the economy continues to rise.

Of course, there are a few ragged spots. But the overall business picture looks bright.

"Business activity has turned now and is moving up. Our mid-year survey shows the economy as a whole is gaining momentum. This forecasts increasing demand for all types of credit." That's the opinion of the president of the Bank of America, San Francisco.

Quarterly Poll — Every three months Prudential Insurance Co. polls 1000 businessmen. They make up the company's Western Business Forecast Panel.

Here's a summary of its opinions:

(1) Some 77 pct expect that their third quarter will equal or top the second quarter.

(2) About 82 pct believe this quarter will equal or exceed the same period last year.

(3) The Panel is more optimistic than in the previous survey. At that time only 66 pct thought their business would improve from the year-ago level.

Good Outlook — Northern California-Hawaii businessmen are the most optimistic. Some 86 pct of the panelists in that region look for third quarter business to equal or better the same period last year.

The southern California-Arizona-Nevada businessmen are the least optimistic. But even there, 79 pct look for business to improve.

Construction and transportation-public utilities industries are the big optimists. Over 91 pct feel that their July-August-September business will certainly be as good as, if not better, than the same period in 1960.

Boeing Stresses Copter Engine

Seattle's Boeing Co. is giving first priority to its new lightweight turbine engine. It's designed for pilotless helicopters to be flown from the decks of destroyers.

Aim: To search out and attack submarines.

The engine will allow the choppers to carry a larger payload of homing torpedoes. Boeing now has more than $1 million in orders.

High Priority—The Navy says the new work has its highest priority, except for the Polaris program.

Primary attraction of the turbine principle in helicopters is lack of vibration. Conventional reciprocating engines pose problems in the rotors and gears.

Boeing first produced its little turbine in 1951 under Navy contracts. Since then, the engine has powered heavy trucks and small ships.

Another Step Toward Completion

BIG VALVE: The California section of the Alberta-California natural gas pipeline project is nearly half finished. Here, a 40,000 lb valve is placed on the mainline gate. There will be 62 of these valves in the line. They're made by Grove Valve and Regulator Co., Oakland, Calif.

*LO-DEK is a registered trademark of Pullman-Standard, a division of Pullman, Incorporated.

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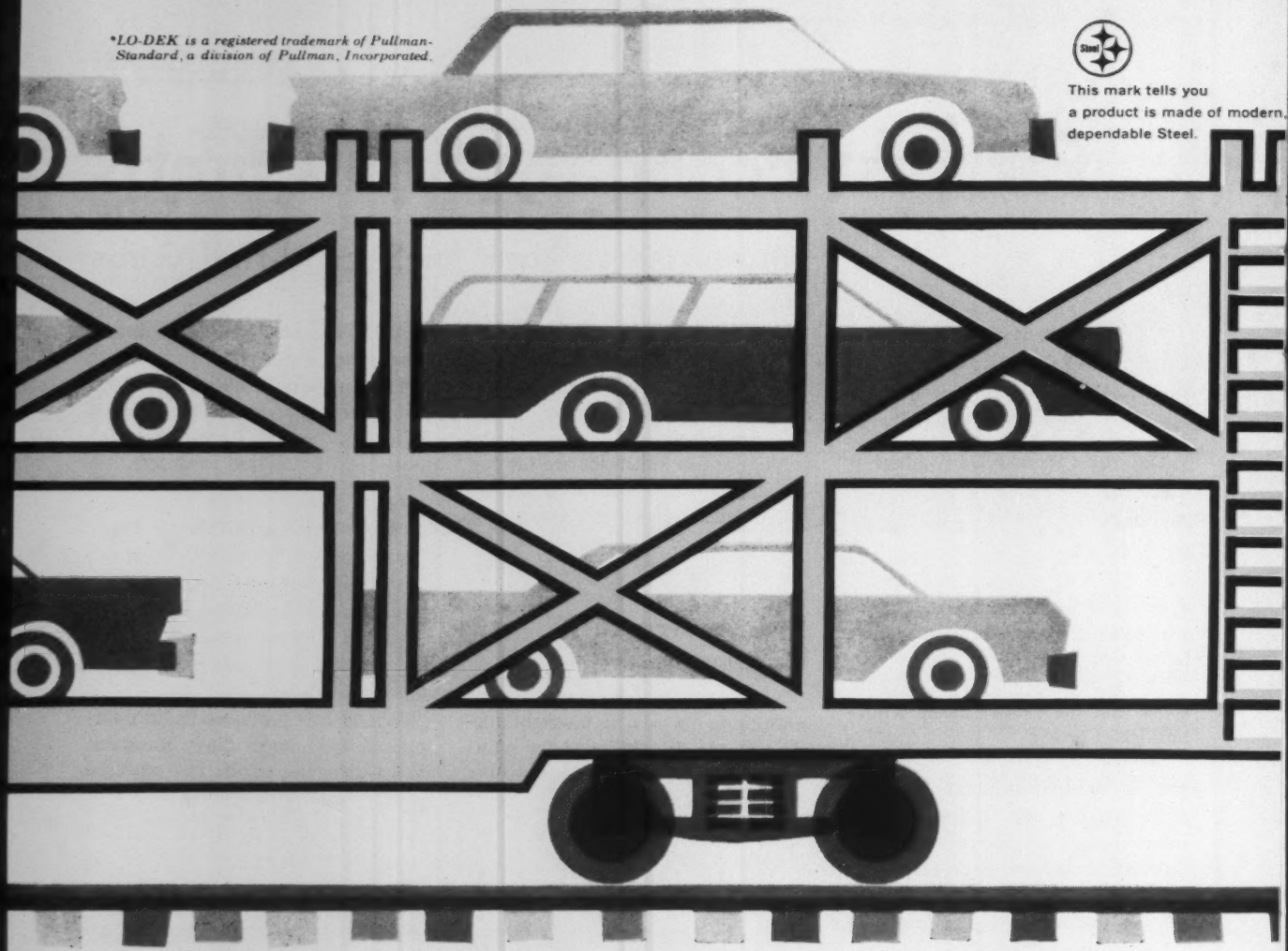

New LO-DEK* lightweight steel cars boost railroad freight business

built 10 tons lighter and 10 inches lower with USS Tri-Ten High-Strength, Low-Alloy Steel

An important factor in the recent increase in piggy-back business among the railroads is Pullman-Standard's LO-DEK Flat Car which weighs 10 tons less than a conventional 85-foot car and has a deck that is 10 inches lower.

30% weight reduction. Skillful design and the use of 18 tons of USS TRI-TEN High-Strength, Low-Alloy Steel shapes, plates and sheets in the underframe, floor and side sills of the car, helped make it lighter and lower. Because of TRI-TEN Steel's strength and weldability, structural and plate thicknesses were reduced as much as 25 to 30% with no sacrifice in strength or safety of the car body. Use of redesigned 28" diameter wrought steel wheels instead of regular 33" wheels helped to lower car height and further reduced weight. United States Steel supplied wheels for these cars.

10 inches less height. Where railroads have low tunnels and minimum clearance underpasses, the extra 10 inches of clearance can be very important, especially when hauling high-cube truck trailers, highway auto transporters, or loaded triple decked automobile racks.

Cargo versatility. The LO-DEK Car can be equipped to handle multi-level automobile racks with capacity of 12 to 15 cars, two standard truck trailers, or conventional container shipments.

Economy. Since 10 tons of weight per car have been eliminated, 250 tons less dead weight are hauled in a 25 car consist—an important railroad operational economy. Substantial savings in motive power can be realized, too, in handling and classification of cars without loads. For further information or technical help on USS High Strength Steels, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pa. USS and TRI-TEN are registered trademarks.

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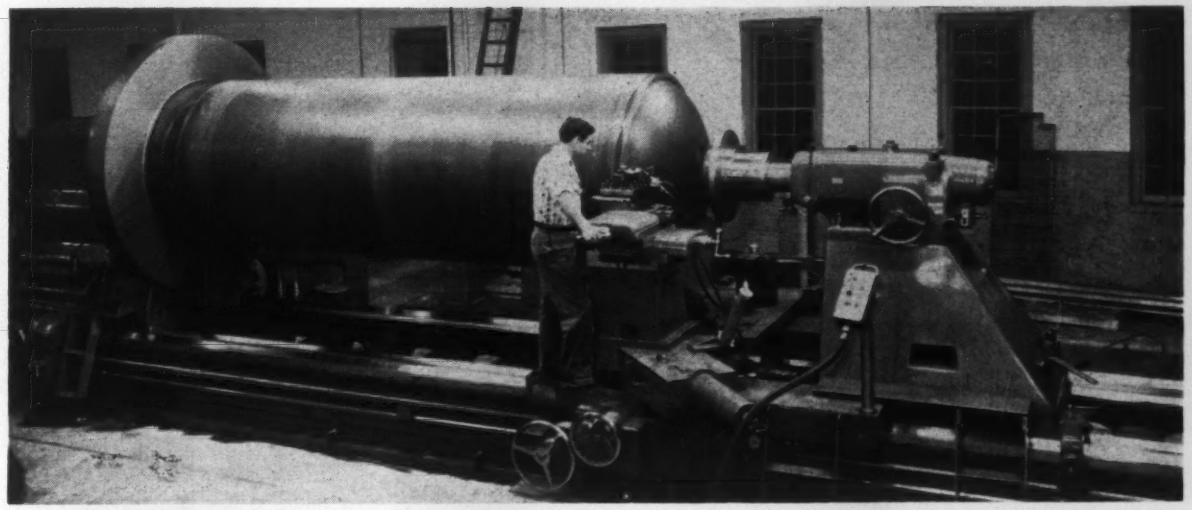
USS **United States Steel**



TRIMMING UP: An American Tool Works Maxi-Swing tracer lathe trims up a fuel tank for the Polaris missile.

Military: Bigger Tool Buyer

At least $12 billion will be added to defense spending in the next fiscal year.

This will mean increased spending for modern machine tools. New concepts will be needed.

By R. H. Eshelman

■ With more than $12 billion to be added to military buying power in the next fiscal year, look for a sharp stepup in spending for modern machine tools.

Conventional tanks, planes, ships and modernized vehicles are coming back strong in the new defense picture. The revised concepts of the Kennedy Administration call for such mobile hardware as helicopters and vertical rising aircraft, new armored personnel carriers, airborne and floatable jeeps, new howitzers and other ordnance combat vehicles.

Bill for such equipment is expected to add $100 million. Research and development may add another $46 million.

The Navy and Marine Corps are also coming in for the forward look, with flying fans for amphibious landings, and new anti-sub weapons.

Obsolete Tooling — Since past surveys reveal a large portion of government and industry tooling is obsolete in terms of modern manufacturing needs, new tools are simply a must. Example of how this may work is seen in development of what is popularly termed the "missile" lathe.

To turn long workpieces, special machines were used at first. Now standard "missile" lathes are available at much lower cost. They were developed from this early experience and do a more efficient job.

Requirements are not as simple as in previous defense emergencies; today focus is less on volume of production than on reliability. Then, too, with smaller numbers of pieces needed for today's military hardware, tooling needs vary.

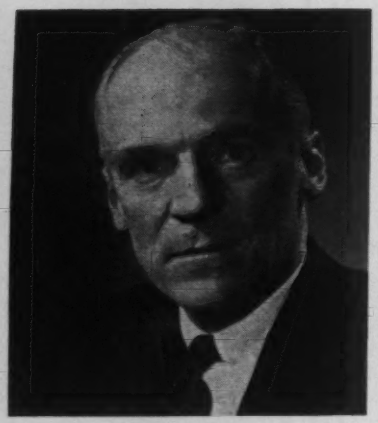
Modern Machines — Experts at American Tool Works Co., Cincinnati, point out that the small defense contractor (or subcontractor) is likely to need modern machines with their more efficient operation. Tools must handle special defense requirements and at the same time be used for other shop operations.

In this category is their Maxi-Swing tracer lathe developed specifically for this kind of work. With a large swing of 96-in. by 25 ft on a 300-in. center it handles the long missile-type part with ease.

With application of 40 hp it takes carbide or ceramic cutting tools. It will make a ¾ depth of cut without straining.

Tracer Option—For this particular work, engineering studies show numerical control affords no particular advantage. However, the machine can turn with or without tracer control. Of course, its use depends on the complexity of contours to be turned. For some complex shapes, it may prove profitable to make up a template and use tracer control for even a single workpiece.

MEN IN METALWORKING



William G. Miller, elected executive vice president, Alco Products, Inc.

Sharon Steel Corp.—T. M. Galbreath, appointed acting district manager, eastern area sales.

Inland Steel Co.—R. S. Gentz, appointed general manager, Indiana Harbor Works; Michael Tenenbaum, appointed general manager, research and quality control; J. J. Halley, named manager, research and development.

Carpenter Steel Co. — T. A. Washburn, appointed district manager, Cleveland.

Achorn Steel Co.—A. S. Johnson, elected vice president; E. H. Johnson, elected vice president; F. C. Kenney, Jr., elected manager, tool steel sales; D. H. Achorn, elected asst. to the president, and general manager.

U. S. Steel Corp.—T. W. Young, appointed asst. general superintendent, Gary Works, National Tube Div.

Crucible Steel Co. of America—K. A. Matticks, appointed product manager, stainless flat products.

Republic Steel Corp.—H. F. Kaiser, named asst. manager, central alloy district; R. T. Paynter, named asst. district sales manager, Denver.

Jones & Laughlin Steel Corp.—E. F. Young, Jr., appointed supervisor, ore research, Research & Development Dept.

Jessop Steel of California—P. E. Magill, named works manager.

Atlas Steels Ltd.—Richard Ellis, appointed manager, Canadian field sales.

Caine Steel Co.—J. A. Rosenberg, named sales representative, Emeryville, Calif., Div.

Eastern Stainless Steel Corp.—E. E. Byrne, appointed controller.

Youngstown Steel Tank Co.—D. T. Culberson, appointed materials manager.

Marsh Steel & Aluminum Co.—M. L. Diamond, appointed asst. to the president.

Gilbert R. Shockley, named general director, product development div., Reynolds Metals Co.

Lewis Steel & Aluminum Co.—R. S. Tully, appointed asst. controller.

Plasteel Products Corp.—C. W. Boyle, appointed general sales manager.

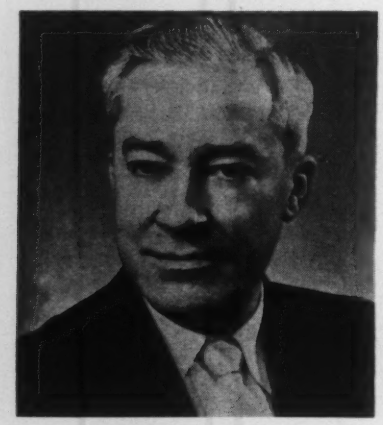
Composite Metal Products, Inc.—J. B. Ulam, elected president.

Alpha Metals, Inc.—D. A. FitzGerald, appointed technical representative.

Allied Research Products, Inc.—R. B. Cassidy, appointed sales engineer.

(Continued on P. 78)

J. H. Eikenberg, elected president, Revere Copper & Brass, Inc.



W. Paul Smith, Jr., elected vice president, sales, Driver-Harris Co.

George Low, appointed Detroit plant manager, McLouth Steel Corp.

Your Carborundum Barrel Finishing Specialist can help you put your metal finishing operations on a profit basis. He has successfully introduced barrel finishing to many plants, large and small. He has proved its value for a variety of manufacturing processes, including stamping, forging, sand mold and die casting, machining and others. He knows how to make a correct on-the-job analysis and can recommend the procedure best suited to your own cost and finish requirements. Let him demonstrate how the **Carbotrol 7** Process can finish your parts less expensively and faster than by any other method. Phone your local Carborundum distributor or district office.

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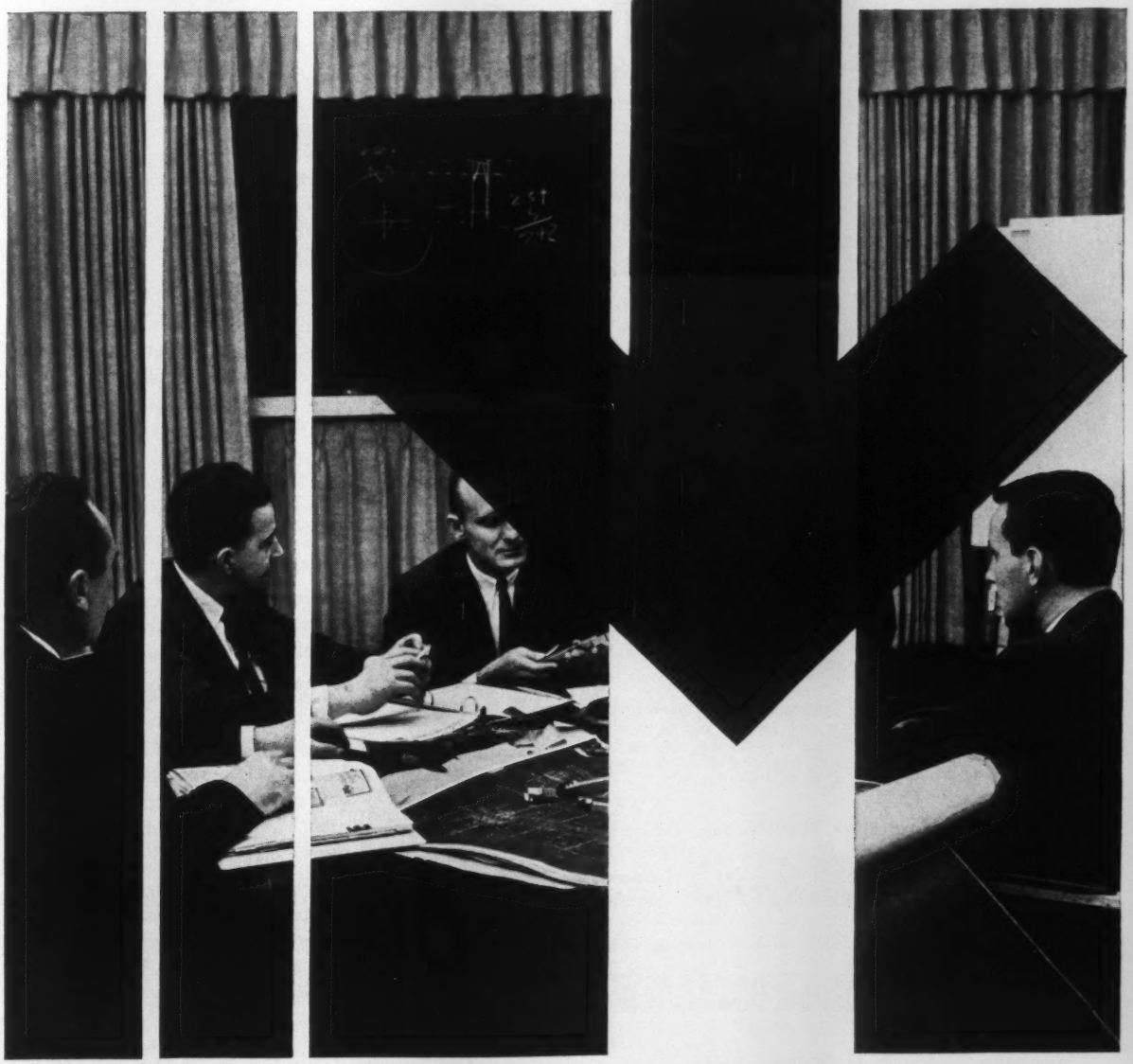

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GLOVEMANSHIP is an art. It involves combining the ideal yarns, processing the cloth by techniques which will impart the wearing and protective qualities desired, creating patterns, styling cuffs and, finally, producing the finished gloves with real craftsmanship. Jomac practices GLOVEMANSHIP.

What does GLOVEMANSHIP mean to you? It means lower glove costs with quality gloves that afford maximum dexterity, more comfort; that resists oils, greases and stains; that protect hands and forearms against such hazards as cuts, burns, bruises and abrasions; that can be washed time after time.

For better fit, greater dexterity, more comfort, longer wear, and maximum safety in handling most chemicals, oils, greases, etc. — specify North PVC Coated Gloves.

To keep workers dry and comfortable in foul weather and to give them superior protection against chemicals, oils and greases—specify North PVC Protective Clothing.

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JOMAC Jomac Inc., Dept. K Phila. 38, Pa.

In Canada: James North Canada Company, Ltd., Simcoe, Ont.

"Jomac Sells Quality . . . and Quality Sells Jomac!"

(Continued from P. 76)

Luria Bros. & Co., Inc.—J. J. Levand, named president, Iroquois Terminals, Inc., a new subsidiary.

Pittsburgh Chemical Co.—James Gore III, named manager, Protective Coatings Div.

Aluminum Co. of America—F. R. Roubik, named chief product engineer, and I. O. Schaefer, named asst. technical director for electrical research and development, Rea Magnet Wire Co., Inc., Div.

Reynolds Metals Co. — C. E. Coghill, elected financial vice president; R. W. Davis, elected treasurer; C. W. Burkholder, elected asst. financial vice president; J. S. Reynolds, elected asst. treasurer; G. F. Schrader, named window market manager, architectural and building products div.

Kawecki Chemical Co. — F. L. Hintze, appointed midwestern sales manager.

Union Carbide Corp. — W. H. Haile and Kenneth Rush, elected executive vice presidents; B. A. Fountain, named electrode products sales representative, Chicago, National Carbon Co. Div.

Anaconda American Brass Co.—H. D. Fitch, appointed general manager, fabricated metal goods div.; Dr. F. H. Wilson, appointed head, physical metallurgy research div.; D. H. Thompson, appointed head, chemical metallurgy research div.; W. E. Bennett, named district sales manager, Providence.

Koppers Co., Inc.—R. T. Eakin, appointed vice president, engineering and construction div.

National Lead Co.—T. F. Owens, appointed treasurer.

Colorado Fuel & Iron Corp.—L. E. Wolfe, appointed superintendent, power div., Pueblo; Karl Uffelman, appointed general foreman, power div.

Vulcan Mold & Iron Co.—R. D. McKenzie, appointed eastern regional sales engineer; L. P. McNabney, named purchasing agent, Chicago district.

Roy Willison, named vice president and general manager, Industrial Div., National Malleable & Steel Castings Co.

F. C. Kroft, appointed staff assistant to the president, Haynes Stellite Co. Div., Union Carbide Corp.

Owatonna Tool Co. — D. B. Hawkinson, named district manager, Tools & Equipment Div.

Taylor Forge & Pipe Works—R. M. Vilsack, named manager, field sales, Chicago; J. A. Lynch, Jr., appointed regional sales manager, eastern div.

Michigan Tool Co.—George Mickas, named manager, research and development dept.

Clark Equipment Co. — S. D. Richards, elected secretary; J. F. Bechtel, appointed general manager, Clark Equipment International, C.A.

Clark Compressor Co., Ltd.—J. E. McCarthy, named Canadian district manager; John Pyles, appointed Toronto branch manager.

American Hoist & Derrick Co.—J. W. West, appointed general sales manager, Crosby-Laughlin Div.

Stewart, Dougall & Assoc., Inc.—T. J. McGann, elected vice president, marketing and distribution analysis.

Link-Belt Co.—A. W. Ostberg, appointed manager, warehouse distribution; H. F. Kurz, appointed distributor representative, central U. S.

Lodge & Shipley Co. — W. L. Dolle, Jr., elected to the board of directors.

Denver Equipment Co. — F. A. Seeton, appointed manager, metallurgical operations div.

National Research Corp.—R. W. Douglass, appointed metallurgist, Metals Div.

Fellows Gear Shaper Co.—W. E. Millikin, elected treasurer and a member of the board.

MacDermid Inc.—Robert Voltmann, appointed product development manager.

National Ultrasonic Corp.—R. C. Kendall, appointed sales manager.

Stevens Manufacturing Co., Inc.—T. H. Cline, appointed manager, engineering.

Diversey Corp.—Dr. M. J. Kelley, appointed director, research laboratories.

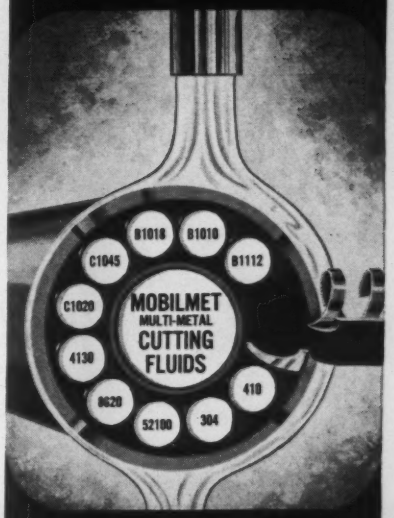
Van Huffel Tube Corp.—K. C. Abbott, appointed district manager, Chicago.

Morton Manufacturing Co.—S. J. Basch, named vice president, engineering.

Beryllium Corp.—D. W. Bodene, named associate, product development dept.

Raybestos-Manhattan, Inc. — D. G. Lytle, named sales manager, Cleveland district, Equipment Sales Div.

SEE AD ON FOLLOWING PAGES...



For more information on Mobilmet cutting oils use this coupon

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NOW, PRESSURE-TEMPERATURE SELECTIVE CUTTING OILS THAT ADAPT TO YOUR MACHINING OPERATIONS

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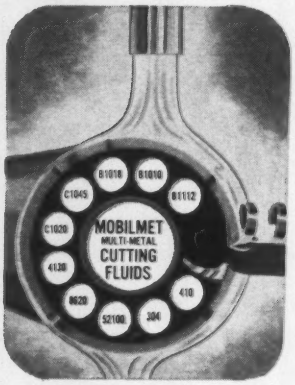


HERE'S HOW MOBILMET CUTTING OILS CAN SERVE YOU!

Greater output, lower costs

Due to a unique additive combination, a single Mobilmet oil can be used on both soft, draggy metals and hard, brittle workpieces. As a result, there's less downtime for tool and cutting-oil changes. You get more production from each machine. And you save on handling costs, since you stock fewer oils. The wide range of Mobilmet applications includes: turning, drilling, boring, milling, gear hobbing, shaping and shaving, threading, tapping, pipe threading, surface and internal broaching, thread and form grinding, thread rolling, forming and special automatic screw machine operations.

Superior machining efficiency

In developing Mobilmet cutting fluids, Mobil research engineers made use of this Tapping Efficiency Tester to evaluate Mobilmet machining efficiency. In these tests and in field service on soft, draggy SAE1020 steel, new Mobilmet fluids out-performed cutting fluids designed specifically for this service.

Versatile new cutting oils offer you greater machine output, longer tool life, reduced loss from rejects, exceptionally wide range of applications! Now, after two years of exhaustive research and field testing . . . new Mobilmet* oils—the first multi-metal cutting fluids ever offered to the metalworking industry.

Mobilmet oils are uniquely versatile . . . help simplify your cutting oil requirements because each grade is effective over ranges of metals and operations beyond the capacity of any conventional product. And Mobilmet oils offer you superior machining results as well—in terms of improved finishes, longer tool life, and reduced staining.

Behind this versatility and effectiveness: a new additive combination, developed and patented by Mobil, which is pressure-temperature selective in its activity and—highly effective over wide ranges of cutting pressures and temperatures. For complete information, call your Mobil Representative or use coupon on preceding page.

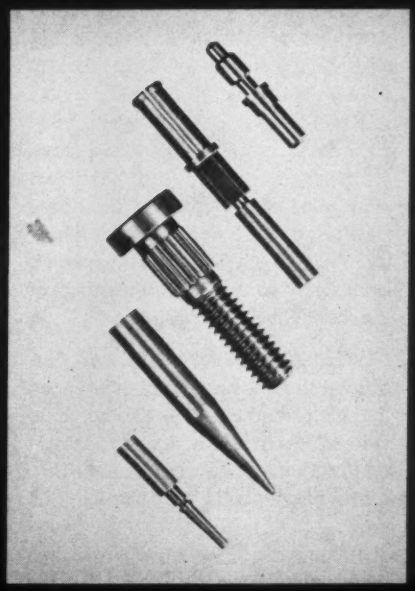
Mobil

*Mobilmet is a trademark of Socony Mobil Oil Company, Inc.

MOBIL OIL COMPANY, 150 East 42nd Street, New York 17, N. Y.

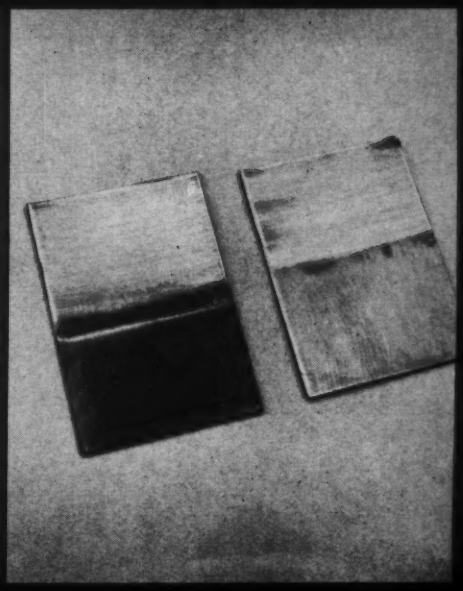
Longer tool life

Protected by heavy-duty Mobilmet, these pipe threading chasers, used for six weeks in moderately severe job-shop service, show little wear on either tool faces or thread crests. Mobilmet oils can mean longer tool life on soft or hard metals.



Fewer rejects

Because Mobilmet oils effectively control built-up edge and tool wear, you get superior finishes—fewer rejects. In some cases, Mobilmet oils reduce the need for additional finishing operations.



Less stain

New additive combination in Mobilmet oils inhibits staining effect. Plate on left was immersed in conventional corrosive cutting oil; plate on right was immersed in heavy-duty Mobilmet suitable for same application. Repolished tops of plates show original condition.

NEWCO

Number One in *Music Spring Wire*

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NEWCO means quality

NEW ENGLAND HIGH CARBON WIRE CORP.

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YOU ARBITRATE IT!

Rush Order

▪ Shortly after the work force went home on a Friday afternoon, a storm-window manufacturing company got a rush order from a big customer. It had to be filled quickly. This meant weekend overtime work.

Right away, the foreman got busy on the telephone to assemble a crew. However, he didn't follow the usual provisions of the contract in calling men to work on Saturday. He knew this would be all right. This was an emergency within the meaning of the collective agreement.

What About Me?—Early on Saturday, the foreman saw he'd need the next day too. He asked those who were already at work to report on Sunday. Then he made a few more phone calls to complete the crew.

It happened that Dan W., a man who would normally have been the first to get overtime, wasn't called in for either day. As soon as he found out about it, he filed a grievance. "I had less overtime than anyone else," he said, "and I should have been given a chance to work."

"You would have been," replied the foreman. "But this was an emergency. The contract says we can by-pass usual procedures when conditions aren't normal."

Eventually the case went to arbitration under the Rules of the American Arbitration Assoc. How would you rule?

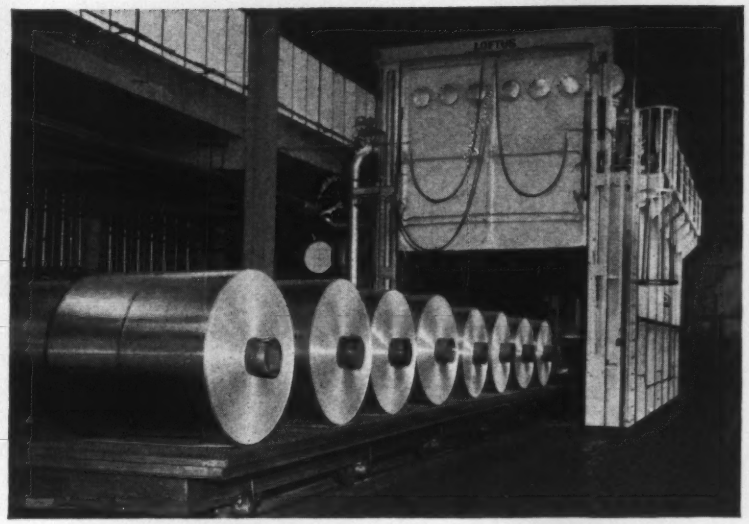
The Arbitrator Ruled:

He upheld the grievance. "The emergency was on Saturday," he said, "not on Sunday." "When the foreman contacted employees for Sunday, things were under control. There was no reason why contractual requirements couldn't have been met." "An initial emergency doesn't cancel normal procedures indefinitely," he decided. "It only defers them until conditions permit their use."

From the files of
The American Arbitration Association

"You Arbitrate It!" appears in the second issue of The IRON AGE each month. Look for it in the August 10 issue.

CAUTION: The award in this case is not necessarily an indication of how aribtrators might rule in apparently similar disputes. Each case is decided on the basis of the particular history, contract, testimony and other facts involved. Some of these essential details may have been omitted in condensing the original arbitration for brief presentation.



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for

melting, holding,

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The many repeat orders for Loftus furnaces are the best evidence of customer satisfaction. Loftus furnaces offer:

- **High Production**
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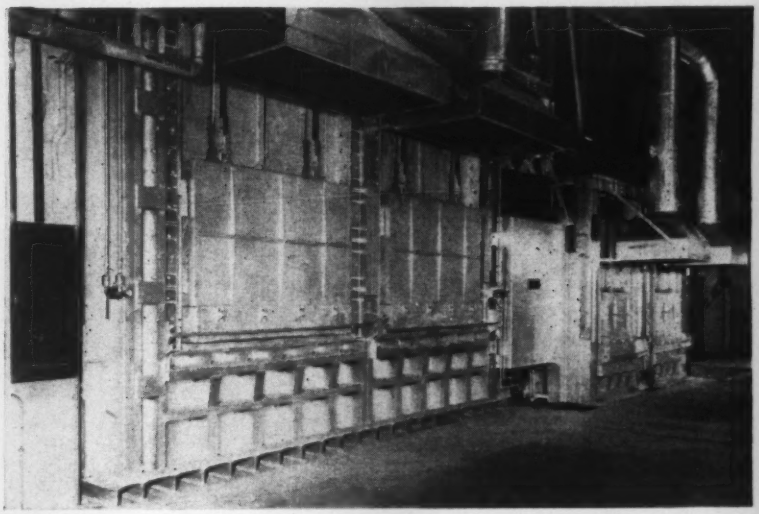
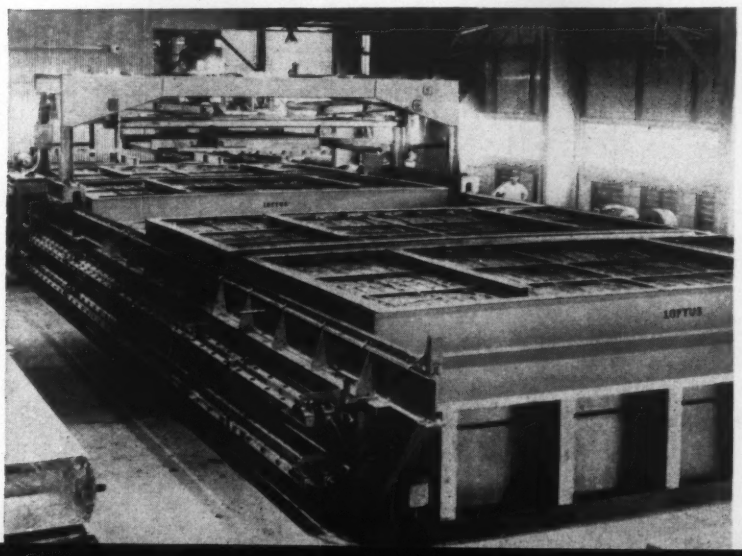
- **Low Maintenance**
- **Rugged Construction**

Whether building or expanding, you too can benefit from the wealth of experience available from Loftus.





Loftus custom-builds complete plants and specializes in furnaces of all types and sizes for both ferrous and non-ferrous metals. Whatever your requirements, it will pay you to call on the engineering and construction know-how developed by Loftus over more than two decades of service to American metal producers.

From first heat to heat treat, look to

LOFTUS

Engineering Corporation

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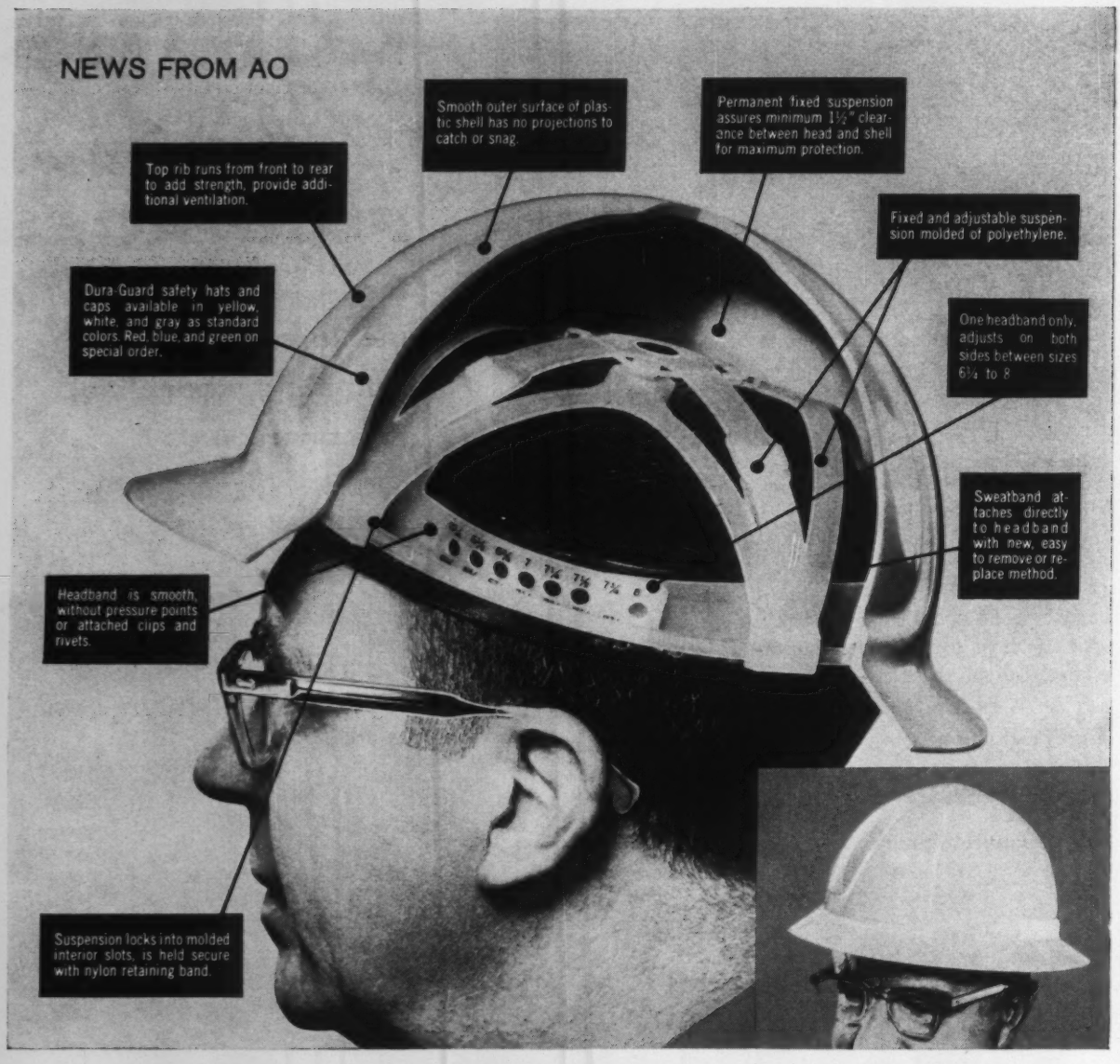

NEWS FROM AO
Smooth outer surface of plastic shell has no projections to catch or snag.
Permanent fixed suspension assures minimum 1½" clearance between head and shell for maximum protection.
Top rib runs from front to rear to add strength, provide additional ventilation.
Fixed and adjustable suspension molded of polyethylene.
Dura-Guard safety hats and caps available in yellow, white, and gray as standard colors. Red, blue, and green on special order.
One headband only, adjusts on both sides between sizes 6¼ to 8
Sweatband attaches directly to headband with new, easy to remove or replace method.
Headband is smooth, without pressure points or attached clips and rivets.
Suspension locks into molded interior slots, is held secure with nylon retaining band.

Now: one safety hat to meet all requirements

Introducing the AO Dura-Guard . . . an *all-new* safety hat designed for *universal use*. Shells and suspensions are molded plastic, without holes or metal parts. New Dura-Guard hats and caps meet or exceed all standard specifications, and *every* Dura-Guard may be used wherever dielectric protection is required. Dielectric strength in accordance with E. E. I. specifications (April, 1961) is available in individually tested hats and caps.

The injection molded shell is of uniform thickness throughout critical areas. Plastic suspension and headband are lightweight, comfortable, long-wearing, nonconductive, easy to clean. Headband adjusts on *both* sides to stay centered in shell, eliminate floating. Sweatband can easily be slipped out for cleaning *without removing any other part*, is made in telescoping halves for comfort and economy. Front half, which tends to soil or wear first, can be replaced at minimum cost.

For full information, contact your AO Safety Products Representative, or write for Folder S-1456.

Your Surest Protection . . . AO SURE-GUARD Products

American Optical
COMPANY

SAFETY PRODUCTS DIVISION • SOUTHBRIDGE, MASSACHUSETTS

Satellite Maps Space Dust

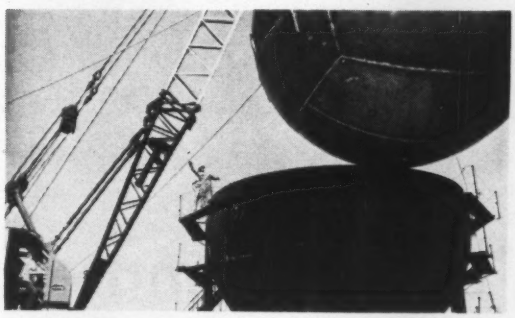
Scientific space probes make few headlines; but they greatly influence design of future spacecraft. Recent Scout launchings of micrometeoroid satellites were an attempt to find out the nature and extent of space dust around the earth. Scientists say this data is vital. There's speculation that the universe may be filled with belts, clouds or even seas of cosmic dust.

Blast Off at Sea

Huge space-shooting facilities will soon be built off the coast of Florida. They'll ease the pressure on Cape Canaveral's crowded firing range. The offshore location boasts unlimited area and plenty of water for rocket cooling. That's why NASA wants industry to come up with detailed plans for facilities in the ocean.

Curbs Evaporation Problem

Using a tank within a tank, Douglas Aircraft Co. stores 90,000 gal of volatile liquid-hydrogen rocket fuel. This "Thermos-jug" design reduces



EASY DOES IT: Crane lifts 17-ton sphere.

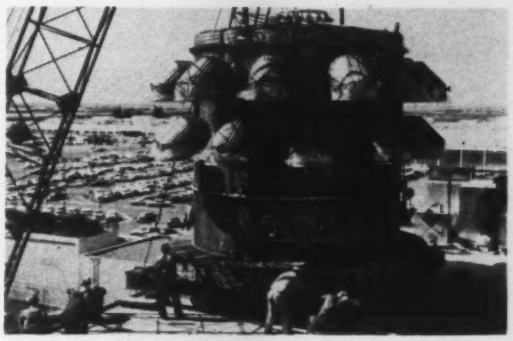
evaporation of the ultracold propellant. Two of these huge storage tanks will service the Saturn S-IV space-vehicle program.

Key to Superconductors?

What happens to semiconductors at 1.5 million psi? The answer may lead to further gains in basic knowledge about superconductivity. This electrical property relates directly to crystal structure. So does semiconductor behavior. Although scientists are guarded on the subject, they admit more ultrahigh-pressure equipment is available. It's logical to assume that superconductivity pressure research is on the way. In fact, some agencies may already have pressure-testing programs.

Simulates Outer Space

By November, a 55-ton space chamber will duplicate conditions 200 miles from earth. Twenty feet high and 18 ft in diameter, it's scheduled to



VACUUM TESTS: Equal 200 miles up.

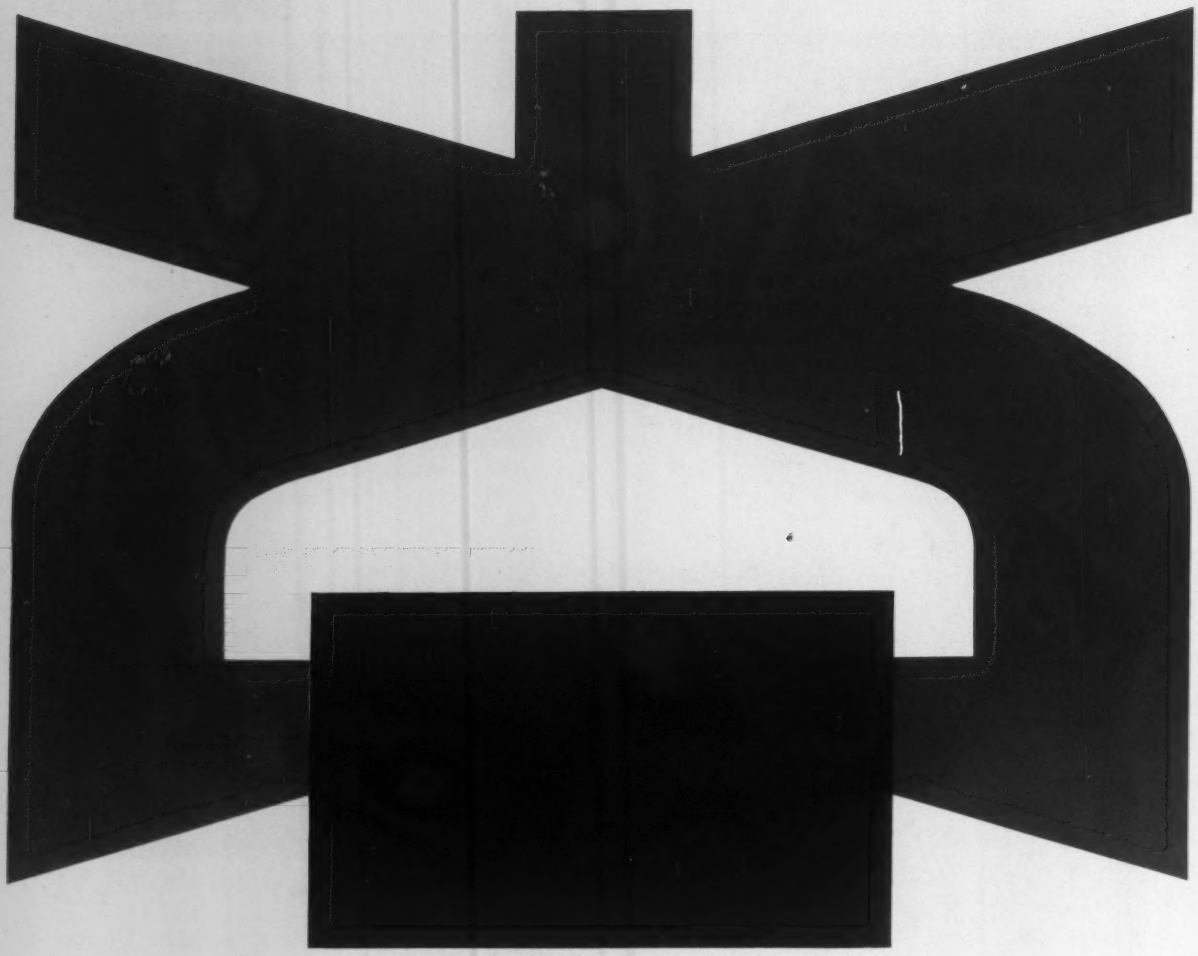
handle 8-ft diam x 15-ft long satellites. Quartz lamps will simulate the sun's heat. Liquid nitrogen will cool chamber walls to −320°F.

Home Away From Home

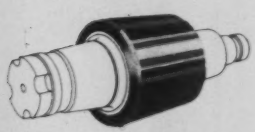
Brig. Gen. David Sarnoff reveals RCA scientists have firmed up plans for a camp on the moon. Remotely-controlled electronic units would set up the base with food, water and power before the first man takes off on a lunar flight. The success of this concept would "prepare the way for exploration of the nearest planets."

Hamstrings Space Effort

The constant row within the defense department and the lack of clear objectives damage the U. S. space effort, according to Sen. Stuart Symington. He cites these factors as two basic reasons for our space lag. On vast space-spending programs, the Missouri Democrat warns: "If we don't have an overall plan, we'll never lead in space, no matter how much we spend."



Heppenstall rolls it, cuts it, handles it



Back-up roll sleeves and rolls

Slab shear knives

Scissors-type ingot tongs

Heppenstall Representatives are thoroughly experienced in the selection and application of our back-up roll sleeves and rolls, knives and tongs — from melt shop to finished product. Their know-how, gained in plant after plant, is always available to help you solve problems and improve efficiency in steelmaking operations. In each product division, modern laboratories are carrying on intensive research programs — for the improvement of present products and the development of new ones. For service or specific information, contact your nearest Heppenstall Representative or write us direct.

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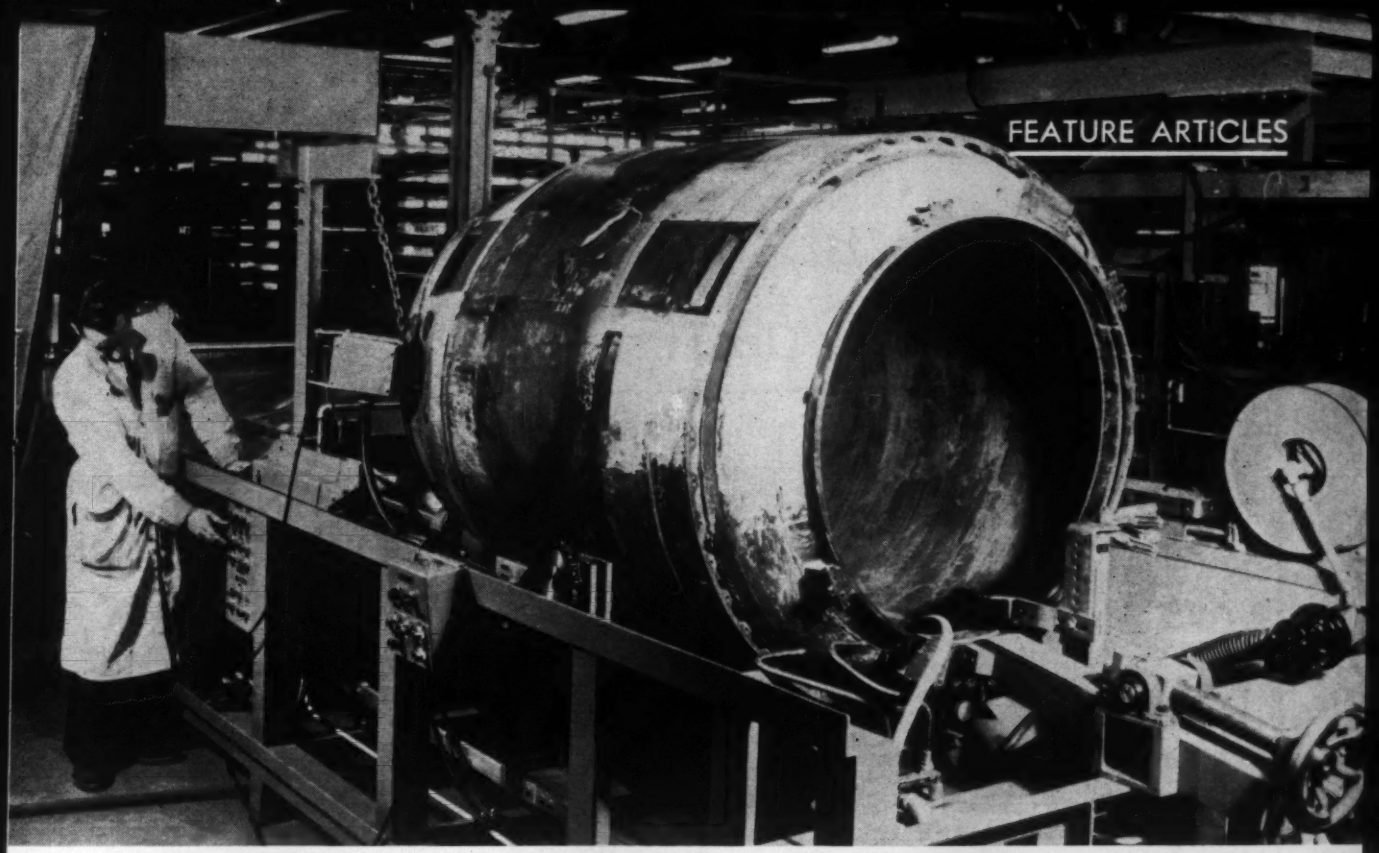


PROBLEMS SOLVED: As the chamber rotates, a central conductor defines inside-contour welding voids.

Missile Parts Get Fast Check

Multi-Directional Magnetization Pinpoints All Defects

If a rocket chamber fails, a million-dollar space shot ends up as a twisted, flaming mass.

Trying to find out why normal test results varied, one company opened a Pandora's box of nondestructive-test woes.

▪ Solid-propellant rocket chambers challenge conventional test methods. Due to weight demands, all chamber walls are made as thin as possible. And the metals that form these walls are heat treated to the highest practical limits.

What is a rocket chamber? Simply stated, it's a length of large-diameter thin-wall tubing. One end of this welded tubing is almost closed. For production runs, low-alloy steels serve as the chamber-wall material. In some cases, chromium die steels are used.

Each chamber takes shape as longitudinal welds secure overlapped sheets. Then circumferential welds join the thin-wall cylinders. After all heads are drawn or spun, forgings are welded onto the subassemblies to form complete chambers.

Vital Tests — A rocket-chamber failure makes a million-dollar space shot worthless. Thus, 100 pct inspection of all chambers is a must.

Magnetic-particle testing is considered to be a reliable nondestructive test method. However, until now, results on the same chamber often varied from inspector to inspector.

A. S. Supplee, Aerojet-General Corp., Sacramento, Calif., reports: "Smug in our knowledge that we had a time-proven tool, we blithely assumed we were using a valid inspection method on welded solid-propellant rocket chambers.

"As time passed," Mr. Supplee adds, "we found test results weren't consistent. Setting out to determine why, we opened a Pandora's box."

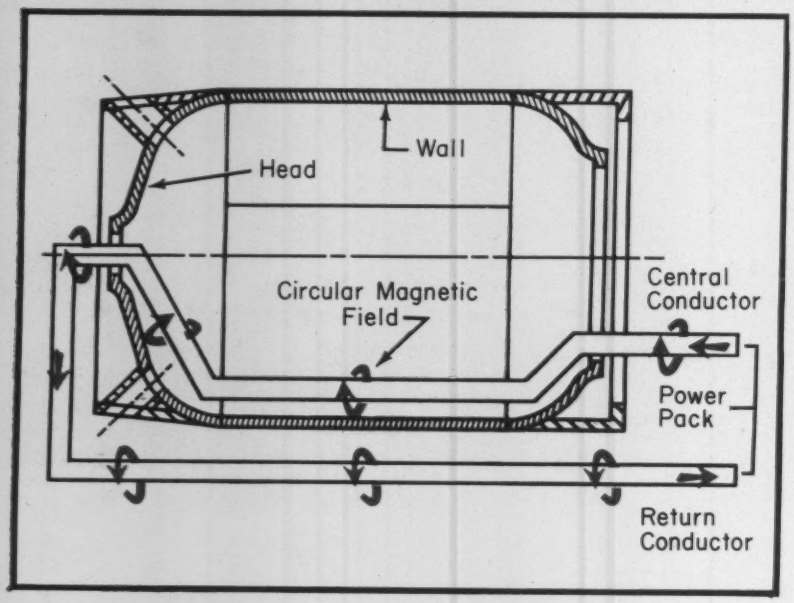
Some Improvement—To upgrade results while boosting testing speed, a central-conductor jig was made. Although it worked well, this homemade jig's magnetizing area was limited to a few inches on either side of the central conductor. One

reason for this limitation hinged on the available power supply's low magnetizing force.

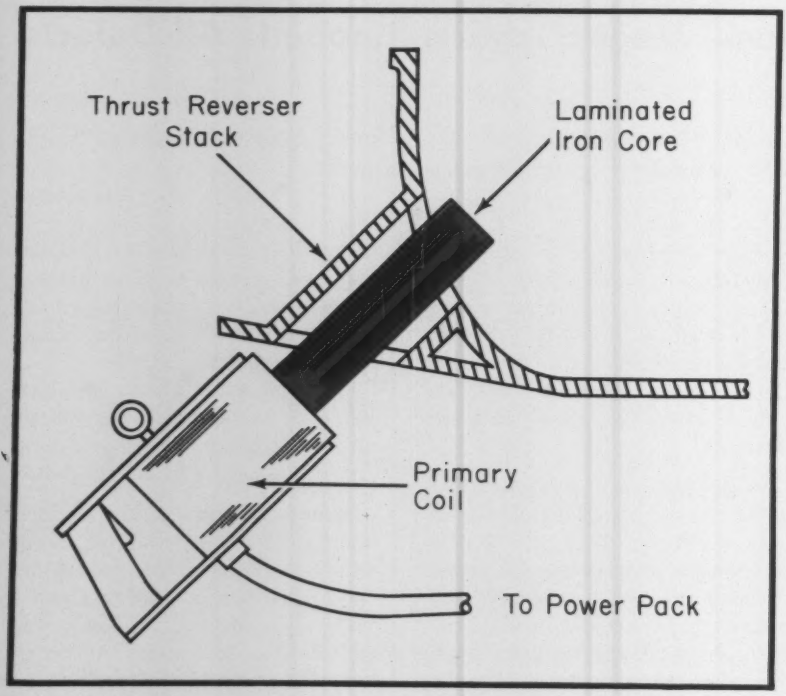
A flexible coil was wound around the chamber's inner diameter; but this still didn't provide enough flux density. Now, let's consider how the problem was solved by the Magnaflux Corp., Chicago.

Theory tells us that a two-shot method is needed to locate defects on all surfaces and in all directions.

Single Turn Wraps Up Test



Prod Detects Port-Wall Flaws



A central conductor induces a circular magnetic field. This field discloses longitudinal defects in the cylinders and radially-oriented flaws in the heads.

The surrounding coil induces a longitudinal magnetic field. This second field detects circumferential flaws in both the cylinders and their heads. For high sensitivity, you've got to have an ample supply of magnetic particles on the chamber's surface.

During the peak of the magnetizing-current flow, it's easy to wash off formed indications of defects. This means that the maximum supply of magnetic particles has to be provided during these peak periods.

Expert Analysis—Blending theory with experience, Magnaflux engineers decided the following requirements had to be satisfied.

First, effective equipment must provide complete test coverage of all stressed areas. Second, the magnetization areas must be correctly applied. This would insure field orientation that's most favorable in detecting random defects.

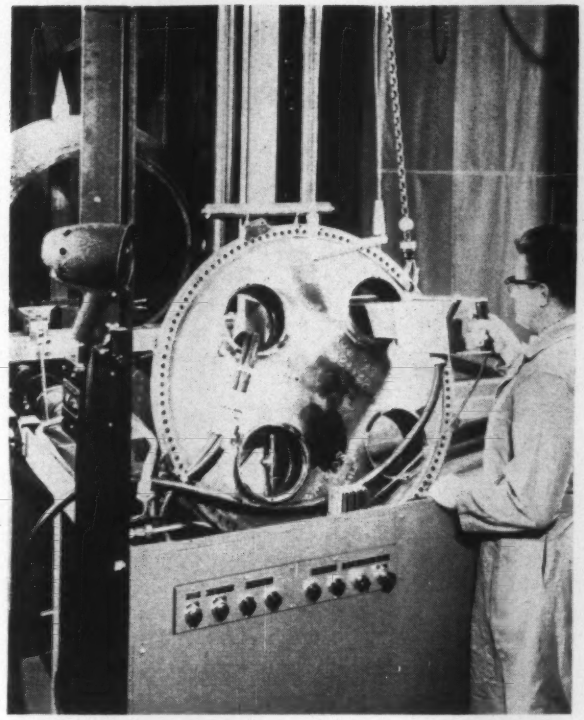
A third must involves the human element. Handling is a potential danger point. Incorrectly applied, nondestructive testing becomes destructive.

Other requirements centered on speeding up the inspection operation and insuring complete demagnetization after each test.

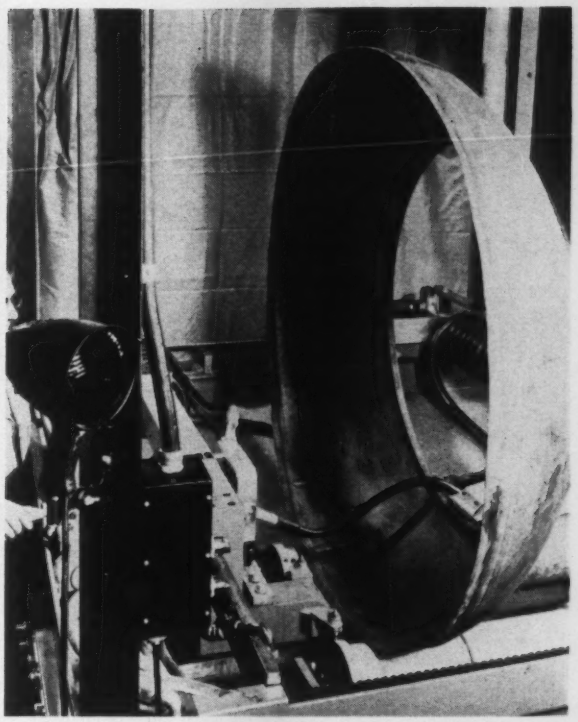
Common Start—A. E. Christensen, manager of engineering at Magnaflux, states: "An early, theoretical approach to the problem—based on the meager data available—would have resulted in equipment similar to that made up in Aerojet-General's own shop."

However, the equipment would have fallen far short of its objectives. Here's why. The geometry and complexity of the chamber has been greatly over-simplified. As a result, induced fields are sometimes magnetically shielded from vital areas. Other times, these fields become so distorted they yield null or weak concentration areas.

The large central conductor is



COMPONENT TEST: An induced-current fixture checks out circumferential flaws around the port areas.



AFT-DOME CHECK: Special inspection setup uses a 10,000-amp power pack to handle dish-shaped part.

another drawback to optimum results. It requires unreasonably-high magnetizing currents. Generally speaking, the effectiveness of a coil's magnetization decreases as its diameter increases. The lighter the mass, the better the results.

Sound Solution—The first drawing shows a more realistic chamber-test setup. With little mass, this central conductor does a very good job.

In effect, the illustrated design acts as a one-turn coil. The fields surrounding the inside and outside legs reinforce each other. This lets them reach areas that would otherwise be magnetically shielded.

With the magnetizing current flowing, complete circular magnetization takes place as the chamber rotates a full 360°.

Now, we'll study effective longitudinal magnetization. It's best induced by using a large yoke-like field fixture. A double set of inducing-pole positions are used to obtain complete magnetization.

Two Full Turns—First, a pair of inducing poles are placed at the ends of each chamber. Later both poles are repositioned at the two lines where the heads join the chamber's wall. Rotating the chamber 360° at each setup insures complete longitudinal magnetization.

Port areas, such as thrust-reverser stacks and igniter bosses, require special consideration. Here's a way to pinpoint circumferential defects in the stacks' weld zones or in the parent metal. The preceding methods can't be used due to magnetic-field distortion.

A special setup, using an induced-current fixture, solves this test problem. This fixture, shown in the second drawing, consists of a laminated iron core which is wound with a primary coil.

Circulating Current — After the fixture is inserted into each stack port, it's energized by a high-amperage power pack. This induces a circulating current into the port. The current behaves like a transformer's one-turn secondary.

Inside the port, these circulating currents induce a toroidal magnetic field. Moving around the port's walls, this field detects all circumferential flaws.

Prior to shipping the new equipment, Magnaflux engineers devised effective demagnetization techniques. Then they checked out all of the equipment.

Customer's Reaction — How do Aerojet-General's people feel about the new equipment? Does it work? Mr. Supplee's answer to the latter question is an unequivocable "Yes."

The special equipment, consisting of a 10,000-amp power pack, a chamber unit and a components unit, has been through tool-tryout and performance tests. It's now handling routine testing of solid-rocket chambers and associated missile and aerospace parts.

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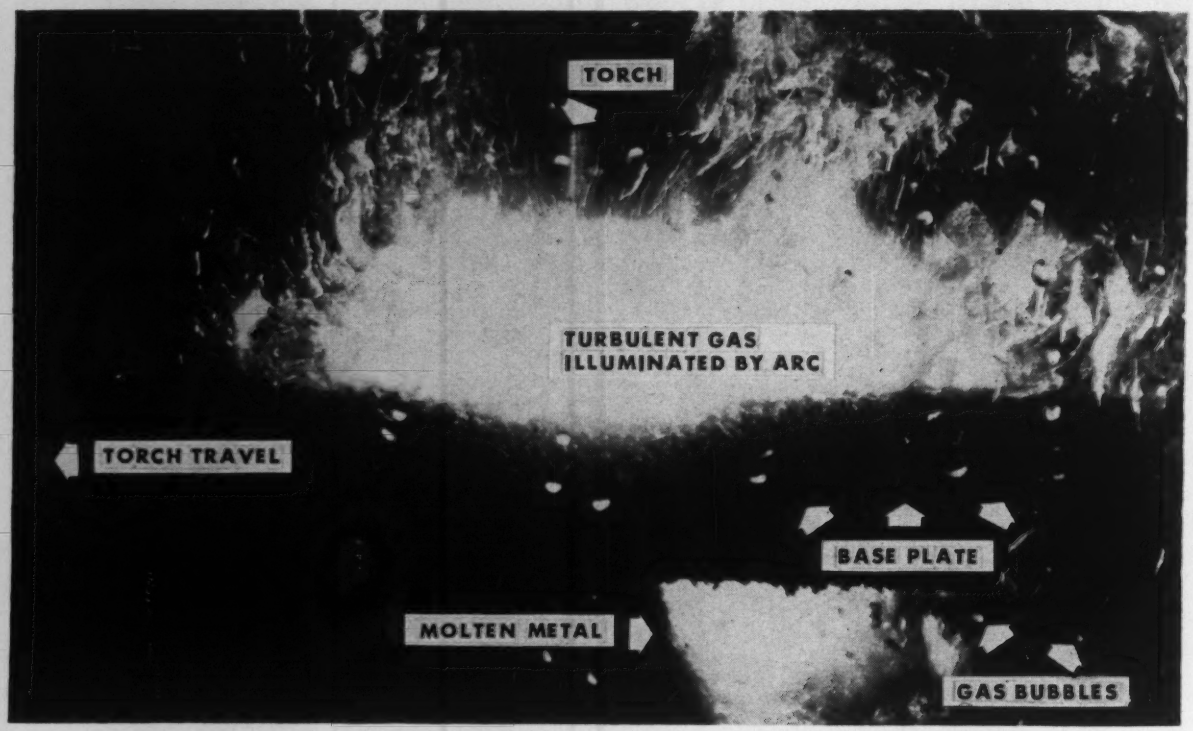


SEARING PROGRESS: Submerged Plasmarc torch slashes through a 1-in. stainless-steel plate.

Torch Cuts Off "Hot" Plates

Underwater Cutting Solves Radioactive Disposal Problem

J. W. Clark—Tech. Sales Representative, Linde Co., a div. of Union Carbide Corp., Birmingham, and **C. H. Wodke**—Metallurgist, Oak Ridge National Lab., Oak Ridge, Tenn.

Metalcutting is not exactly a cinch when you can't even get near what you want to cut.

Throw in radioactivity, put the whole works under water, and you really have a problem.

■ Atomic power stations and research reactors are a mixed blessing. Along with the benefits come some unwanted guests. Radioactive wastes fall in this category.

Spent fuel elements, contaminated structural parts, shielding and coolants are all "hot." Like relatives, they can be hard to get rid of.

Hands Off—Safe removal and disposal of these wastes hinges on mechanical-handling devices. Thick walls of concrete, steel and lead separate the removal expert and his "hands." He must manipulate these devices by remote control. To further complicate matters, access ports are often tiny.

Such was the case in recent maintenance on the Homogeneous Reactor Experiment at Oak Ridge National Laboratory, Oak Ridge, Tenn. Union Carbide Co.'s engineers had to remove several perforated-diffuser plates from inside the highly-radioactive core vessel.

Hard to Get—These ⅛-in., Zircaloy-2 plates were 18 ft below working level. The only way to reach them was through a 2-in. diam access port. Obviously, they had to come out through this port, too. Cutting the plate into small enough pieces was the equally obvious solution. But, how to do it?

Size ruled out mechanical cutting methods such as sawing and shearing. However, Linde Plasmarc cutting equipment would do the job, provided arc heat and molten spatter wouldn't damage adjacent reactor parts and equipment.

Use Tiny Torch — Oak Ridge

personnel accepted the Plasmarc process. Laboratory tests convinced them that cutting under water would restrict heat and spatter to a safe radius.

Development forged ahead on a tiny cutting torch and remote-control manipulator which would fit through the 2-in. port. When these devices were ready, the reactor was shut down and the water level lowered. This left the plates submerged under 30 in. of water.

Then the torch went to work. It cut the plates into small strips. With the aid of the manipulator, these strips were removed through the port.

Double Duty—The water served a dual purpose. As was expected, it guarded against damage due to arc heat and molten spatter. It also put a damper on the spread of radioactive particles.

Normally, the reactor - control medium, in this case water, would be considered a nuisance. However, the Plasmarc process turned the tables and used it to good advantage. Let's take a closer look at this technique.

In the first place, experiments show the process works just as well under water as it does in air. It's a good answer to high-speed cutting of stainless steel, aluminum, magnesium and other reactive metals.

The intense plasma jet originates by ionizing argon gas under pressure in the tungsten arc. Expelling it through a constricting nozzle adds force. When it's used under water, the torch needs no internal cooling medium.

Contact! — A high frequency spark touches off the torch even while it's submerged. Also, the continuous argon flow of 5 cfh bans water from the torch. This prevents electrode deterioration. On the Oak Ridge job, argon flow was increased to 100 cfh. Power came from a dc source supplying 400 amp at 84 v.

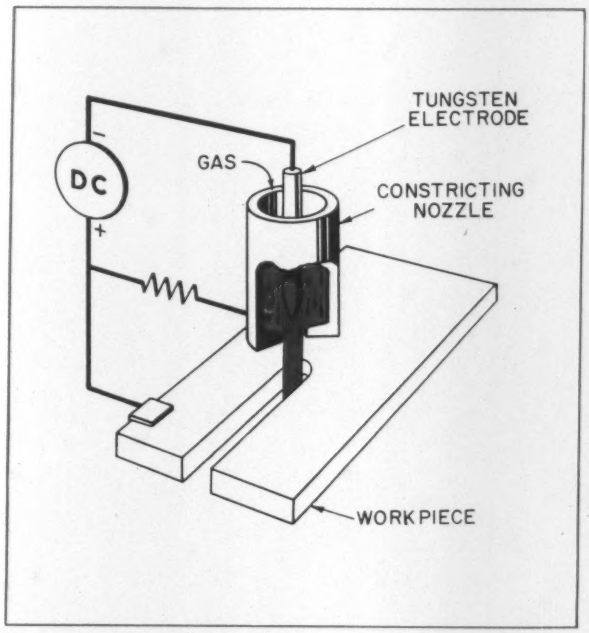
With Plasmarc, cutting speeds of 20-150 ipm are possible. It depends on the material, its thickness and the current available. But before you put the torch to work, you first adjust it to the correct cutting speed. When the arc starts, it immediately forms the kerf. Speed of travel remains constant until the cut's completed.

Looking Ahead—In the future, progress in nuclear science is bound to multiply radioactive - disposal headaches. Construction, upkeep and scrapping of reactors and nuclear-processing systems call for refined handling methods. Underwater cutting boasts some inherent advantages in these uses.

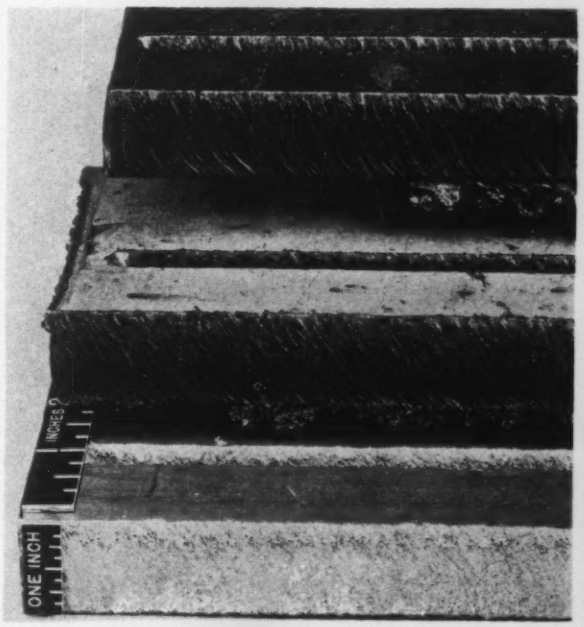
We've already mentioned the automatic water - quenching feature that protects nearby components. If it weren't for this, these parts would have to be removed or shielded.

In addition, the submerged cutting action causes water turbulence. This bubbling water washes the gas, and the molten and oxidized metal. It also traps fine particles and inhibits the spread of radioactive residue to the air.

Other Fields—Of course, underwater cutting is not limited to reactors. When you're preparing metals for fabrication or metallographic examination, the cooling action of water limits the depth of heat-affected zones. Naturally, the crystal-structure changes caused by these zones are likewise restricted. Clean-up time and costs tumble. Improved profits are the result.



NOZZLE BLAST: Cutaway shows constricting nozzle. After rapid expansion, gas ejects at high speed.



SAMPLE CUTS: Plasmarc-ripped plates include: Carbon steel (top), stainless (center) and aluminum.

Dual Atmospheres Team Up To Cut Heat Treat Costs

Using two atmospheres instead of one may be the answer to your heat treat problem.

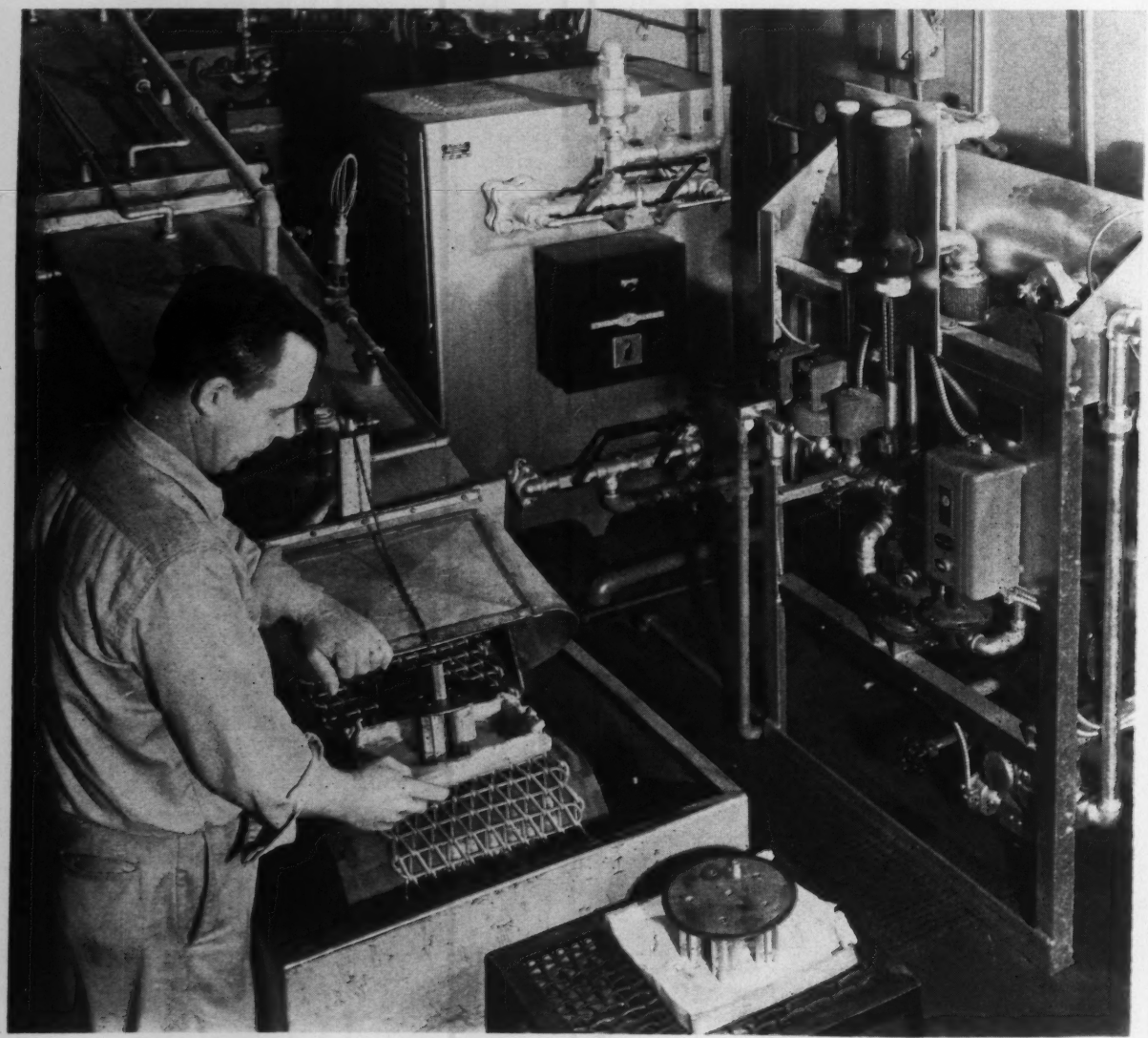
How does the new "dual atmosphere process" help? Heat treat costs are down 22 pct as atmosphere costs tumble.

▪ Furnace designers are keeping up with the rest of the metalworking industry when it comes to technical advances.

One of the latest innovations calls for heat treating in two atmospheres. It's claimed that the new process cuts overall heat treating costs up to 22 pct.

Applications include: Bright treating of stainless steels; copper or nickel brazing of stainless steels; bright annealing; ceramic-to-metal brazing.

SAVES COSTLY GAS: Brazed assembly is unloaded after heat treating in "dual atmosphere process." Technique calls for the use of low-cost protective gas at the loading and unloading zones of the furnace.



Cuts Gas Cost—Patented by C. I. Hayes, Inc., Cramston, R. I., the new process permits less use of the high-cost atmosphere normally used; it substitutes a given quantity of low-cost atmosphere of high specific gravity at both entry and exit ends of the furnace. The less costly gas acts as a barrier and prevents the escape of high-cost gas from the furnace chamber.

A Hayes design of some years ago, the "Humpback furnace" with an elevated heating chamber, took advantage of hydrogen's low specific gravity to give substantial savings when processing vacuum tube parts.

The newly announced "dual atmosphere process" is a natural outgrowth of this type of furnace. Its success also depends on the relative specific gravities of gases.

Pipes Two Types—The higher-cost hydrogen or dissociated ammonia is introduced into the elevated heating chamber. At the same time, the Hayes system pipes a low-cost protective atmosphere (usually dry exothermic gas) into the loading and unloading zones.

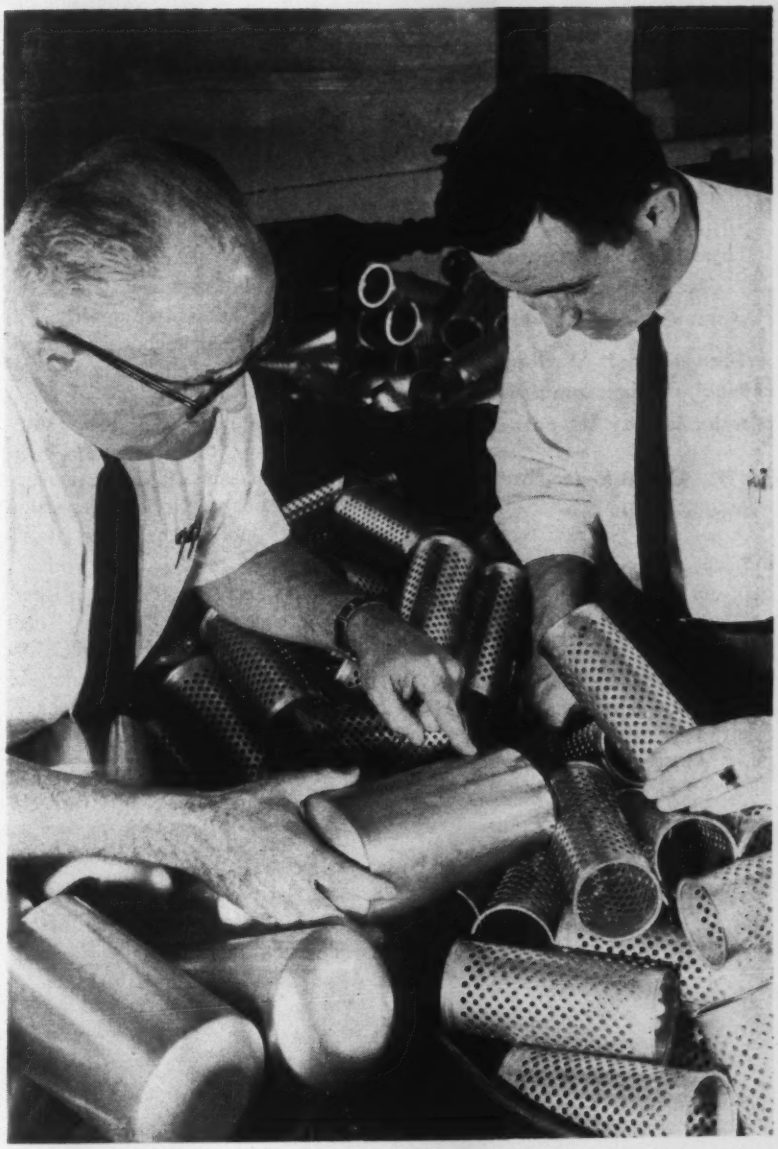
A thorough knowledge of the behavior of various protective atmospheres plus experience with layout and sizing of piping arrangements combine to make this system practical.

Savings in atmosphere costs range up to 60 pct, estimates C. I. Hayes engineers. Since atmosphere consumed on a hydrogen-protected job can amount to as much as 35 pct of the cost of heat treating, the new process can reduce overall costs by up to 22 pct.

Quality Is at a Par—Quality of work produced with the dual-atmosphere process is in every way equal to that produced in hydrogen or dissociated ammonia alone, claim Hayes officials.

Simple flow control and metering devices insure a positive flow of the lighter gas from the heating chamber into the loading and unloading zones. Thus, the work is fully protected while at heat.

The heavier gas serves to blanket the work as it passes through the atmospheric quench phase of the process. Also, blanketing both loading and unloading zones of the furnace with a dry exothermic gas enhances the safety of the total operation.



BRIGHT FINISH: Quality of stainless steel parts, bright annealed by new process, is comparable to that obtained by standard practices.

Completely Equipped—In addition to controllers and metering instruments, the Hayes process includes gas generating and drying equipment to produce the required protective atmospheres.

These units are sized and engineered to provide a balanced system which operates with a minimum of adjustment and supervision.

The dual atmosphere process is available in three different ways. It may be obtained as an auxiliary feature with a "Humpback furnace." It may be applied to a "Humpback furnace" in the field as a purchased extra. Or arrangement can be made to license this patented process for use with other makes of furnaces. The patent number is 2992147.

Can Automatic Test Systems Fill Reliability Gaps?

To really evaluate your product, you must look at it from a customer's point of view.

The public is getting mighty critical. Your quality control standards may be outdated.

By **W. N. Redstreake,**
Associate Editor

■ Space-age requirements place stringent demands on performance. The reliability of 100,000 or more complex parts in a missile must approach 100 pct. There's no room for error in a successful space probe.

However, reliability isn't just a national-defense problem. It's rapidly becoming a key word in industrial and consumer fields. Today, the accent is on quality. No one wants to buy second-rate products.

Quality Pays Off—Flashy automobiles have lost their status-symbol role. Instead of a new car every year, cost-conscious buyers shop for dependable long-lasting transportation.

Buyers are also studying performance data on everything from lawn mowers to refrigerators. Just as critically, purchasing agents are appraising everything from fasteners to tape-controlled machine tools.

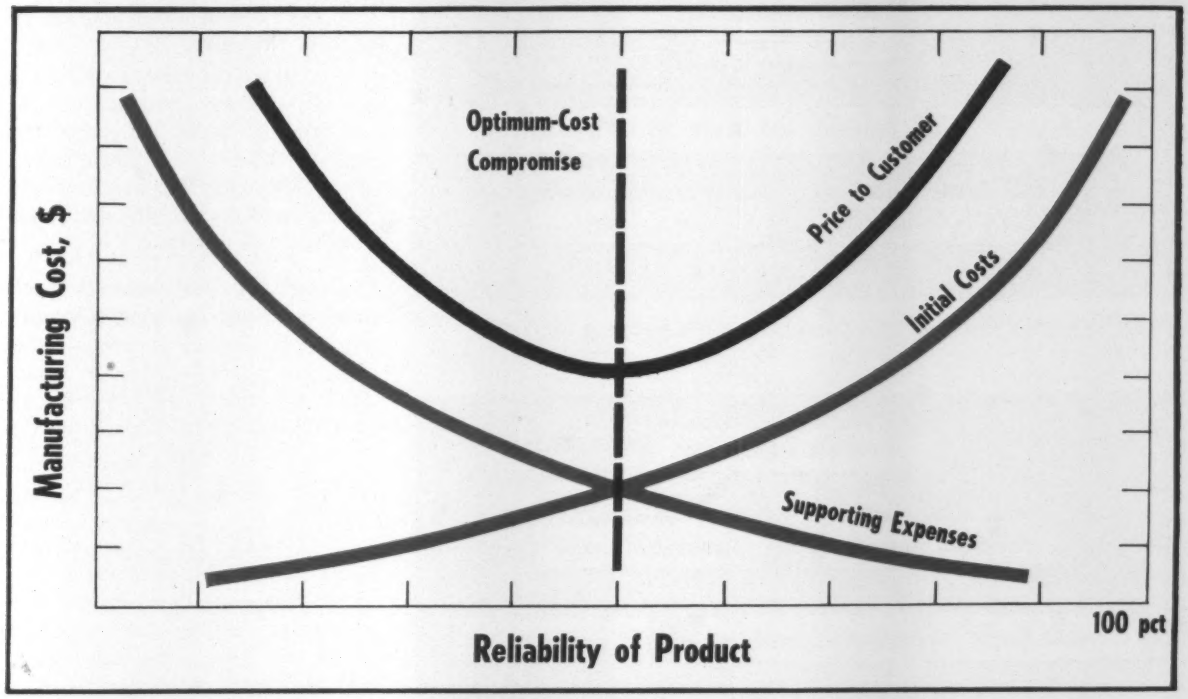
Behind every faulty product, there's a technical explanation. But when a housewife's washing machine breaks down, she doesn't care if a lockwasher was omitted during assembly. All she knows is that the manufacturer is to blame. And she's right.

Management's Role—Reliability must be considered a management problem. Every dollar spent wisely on quality control yields worthwhile rewards. By improving quality, a company builds up a good name. This opens the door to satisfied customers, repeat orders and lots of free word-of-mouth advertising.

An effective quality-control pro-

ADVANCED SETUP: Automating all quality data and test analyses yields "total quality control."

Quality-Control Costs Often Dictate Prices



gram doesn't have to cost extra money. American industry already spends $35-$50 billion a year to control quality. In some customer-oriented companies, quality-control costs approach the total cost of direct labor. In other companies, these quality costs dictate product prices.

Where does a reliability problem begin? Very often it's present at the birth of a revolutionary design. Other times it sneaks into established manufacturing processes.

Plan Ahead—Let's consider how to attack this problem. Starting from from scratch, you've got to create an effective program. At the start, management must clearly define its policies, objectives and degree of financial support.

Too often, management is reluctant in approving the funds needed to support a comprehensive program. But when the chickens come home to roost, management sings a different tune.

Even when repair and debugging costs are borne by the customers, the company suffers. A poor quality-control program damages the company's reputation. This directly affects future sales.

The final cost of an unreliable product is hard to gage. Once stung, most customers take a dim view of all products associated with a blackballed company that puts its name on worthless goods.

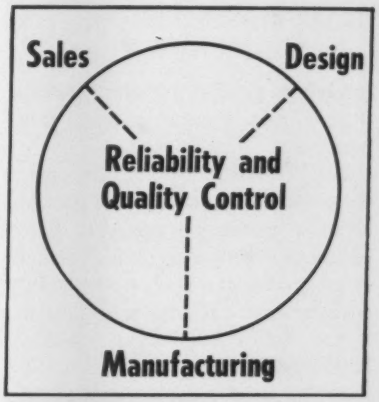
Use Control Wheel — Effective quality controls take the form of a hub which links sales, design and manufacturing objectives. By linking these sometimes loose-jointed interests, a centralized quality-control program serves as a focal point.

Both formal and informal lines of communication can pass through this common point. Thus, the central hub tends to harmonize and blend departmental interests.

All departments, of course, always have the company's interests in mind. However, they should also never forget the company is in business to please its customers. And nothing is more pleasing to the customer, and easier to sell, than a dependable snag-free product.

Key Factors — The three main elements in setting up sound reliability controls include inspection, statistical quality control and product assurance.

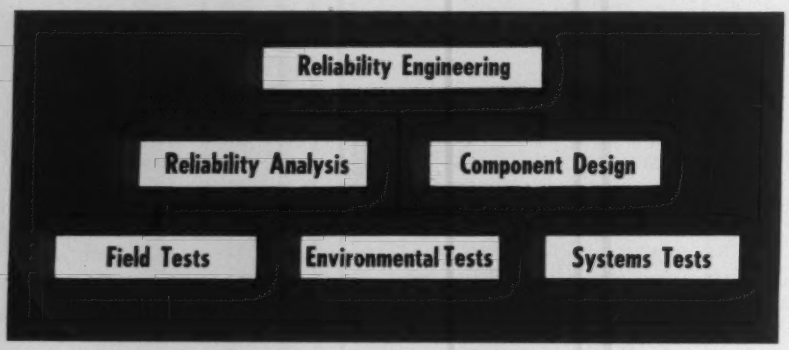
Inspection is closely tied in with manufacturing. In general, it covers



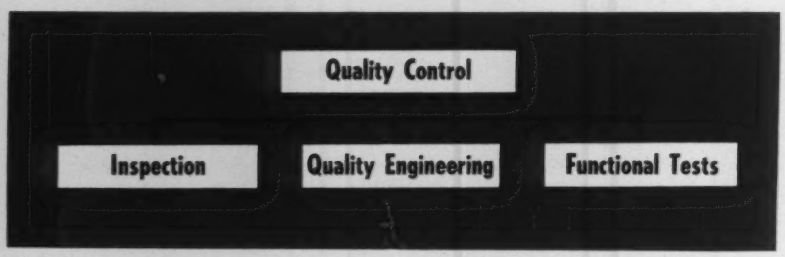
CONTROL WHEEL: Effective quality and reliability controls take the form of a hub which links sales, design and manufacturing efforts.

Program Needs Good Base

OVERALL DECISIONS: Prime products merit top-level attention.



RELIABLE DESIGN: Engineering plays a vital role in reliability.



GRASS ROOTS: Automatic test systems improve in-process workruns.

receiving goods, process checks, finished-part analysis and test-equipment maintenance.

Statistical quality controls, sometimes called quality engineering, serve a preventive function. Some of these functional duties include data analysis, process-capability studies and experimental designs. These duties interweave manufacturing and design stages.

Now, let's move along to the third key element in a sound quality-control program. This third leg in the base of a reliability program centers on quality assurance. Sometimes it goes by other names, such as the functional-test department or the metrology group. In many ways, it's the most important phase of any reliability program.

Blends Facts—All three of the grass-root elements can be automated. In aiding each of these quality-control groups, computers cut across various functions. This is a healthy situation. It helps to blend inter-departmental interests for the common good.

One of the biggest advances in automating quality controls centers on a new line of automatic test systems. Developed by the General Electric Co., these control systems classify and summarize data on in-process workruns.

Acting as the base on which a sound reliability program can be constructed, these automatic test systems offset their own initial costs. They pinpoint trends toward failures and correct deficiencies before scrap is generated.

Completely Automatic — Here's how this objective is met. Advanced electronic devices prevent—rather than just reject—failures in manufacturing lines. By doing this quickly enough to outpace the dynamics of a changing process, they improve quality and reduce overall costs.

In essence, the automated controls gather and summarize data. Then they make decisions and start corrective action on in-process workruns. An evaluation-and-decision device interprets all data. It automatically closes control loops on the process.

Recorders yield print-out records of product performance. A feedback system provides data flow between all functions. This feedback also activates mechanical units for handling, classifying and adjusting the product.

For analysis of quality trends, General Electric has developed a simplified computer. Called the X-Bar Sigma (Trend) Computer, it works hand in glove with a data classifier.

By performing computations on successive samples in a production run, the new computer quickly and accurately predicts all trends or changes in a manufacturing process. As a safeguard, it even warns of progressive errors which could put the process out of control.

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Nickel-Ball Anodes Aid Plating

New Concept in Basket Design Offers Major Benefits

A titanium basket could hold the key to improved results in the nickel-plating process.

Early indications look very promising for this recent design. Economy is involved.

■ There's something new in nickel plating. The development concerns the anode. In the past, anodes of nickel have provided what was needed. Now design has entered into the picture.

The new anode consists of a number of 2-in. diam nickel balls nested inside a perforated basket of commercially pure titanium. Conceived by Univertical Corp., Detroit, the beehive-type structure greatly reduces downtime while improving plating quality.

First on the list of benefits is improved thickness and efficiency in nickel plating. Conventional nickel anodes corrode to about 10-40 pct of their original weight. They must be replaced from time to time in order to maintain uniform plating efficiency.

Starts at the Bottom—Anodes, of course, corrode at the bottom. In the new setup, it's just a matter of replenishing the supply of nickel balls through the top of the cylindrical stack.

With the beehive system, therefore, very little time is lost to shutdown. Also, each nickel ball dissolves completely; there is no anode scrap.

As a basket material, titanium puts the damper on contamination from iron and copper. With normal care and usage, a basket should last about 10 years.

Properties Pay Off — Titanium has the properties to make this unusual system work. It will pass current to metal in contact with nickel-ball anodes, but it will not pass current to the bath. Titanium doesn't corrode in a nickel bath.

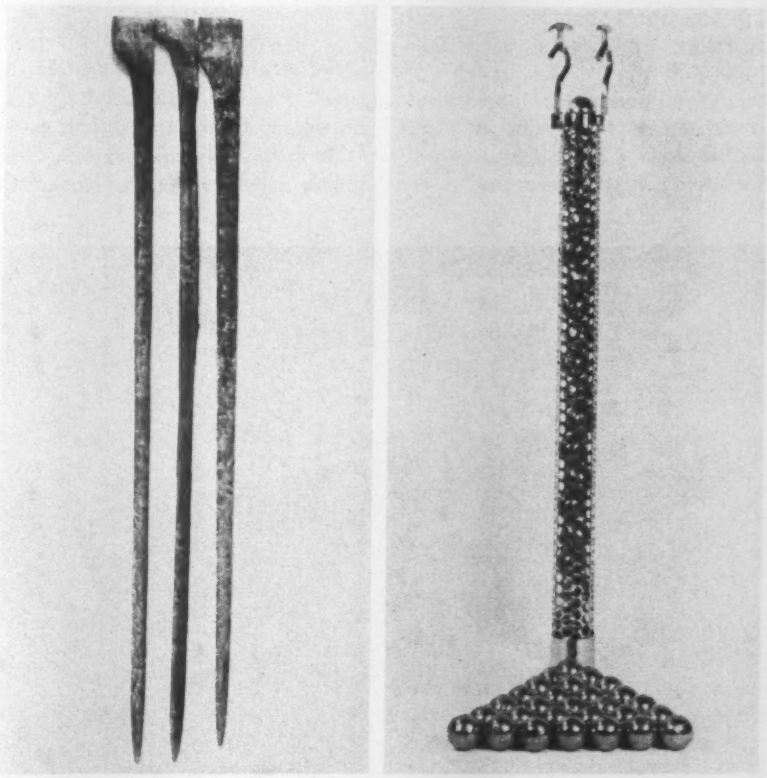
The metal can be used with nitric acid at all concentrations and temperatures. When it's made anodic at normal plating voltages, titanium becomes nonconducting at the interface of the metal solution. Current will only flow at metal contact points.

Test Proof—Tests reveal the ability of titanium to withstand the effects of corrosion. In four baths the metal showed no penetration at all from corrosion. Tested at 150°F for 1400 hours, the solutions included bright-nickel (both low- and high-chloride), plain bright nickel and nickel sulfamate.

Another test of 1400 hours was conducted with a conventional chromium bath. This time the temperature was 130°F. Here penetration reached 0.1 mils. Similar results were revealed on acid copper sulfate at 100°F.

Another advantage offered by the system is the elimination of floating bags in air-agitated baths.

Univertical Corp. does not recommend the use of titanium baskets in fluoride or fluoroborate solutions.



STEADY PERFORMANCE: New anode (right) is a titanium basket which holds a supply of 2-in. diam nickel balls. Beehive structure is replenished when needed. Conventional anode (left) has to be replaced.

Oxygen Cutting Gets Big Lift From Numerical Controls

Machine tools work well with numerical controls. Why not oxygen-cutting machines?

The match is made. Contours and straight lines can now be programmed to cut thick plate.

■ Numerical controls have come to the flame cutting of plate. Taking its orders from pre-punched tape, a new machine can cut straight lines and contours in sections 48 ft long, 22 ft wide and up to 6 in. thick. Both of these functions can be performed automatically to an accuracy of $\pm 1/64$ in.

Two manufacturers are responsible for the new system. The cutting machine proper has been designed by Air Reduction Sales Co., a division of Air Reduction Co. Inc., New York. The director end of the system is a product of General Electric Co.'s Specialty Control Dept., Waynesboro, Va.

The cutting machine has teamed up with GE's Mark Century "numerical contour control system." This is the same basic type of equipment already used to automate many machine tools.

Its success in the field of machine tools was one reason for the system's selection. Airco officials also noted that with the Mark Century the overall system could be computer oriented.

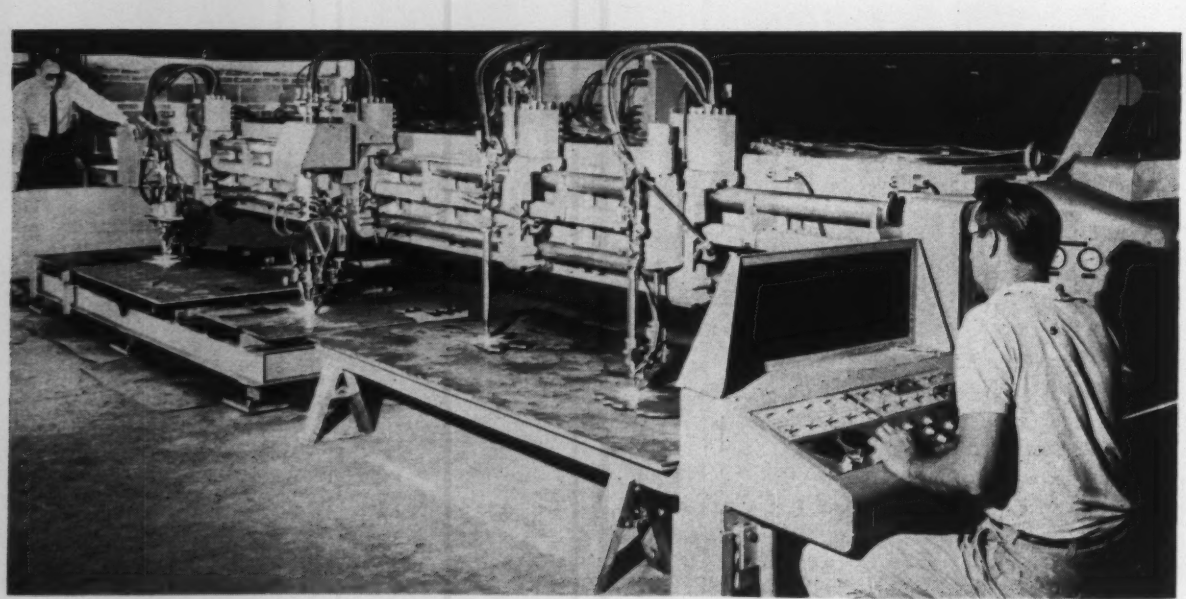
No More Templates—The new package features many savings. It eliminates templates, template tables and any need for an operator to control the flame-cutting process. The whole system has been designed to operate economically.

Drawings are made of the part to be cut. Then the basic dimensional data are extracted from the drawings. These data along with other auxiliary functions are worked into a single program. Next, information on the program sheet is punched onto paper tape which serves as the input for the cutting machine.

An operator, seated at the control desk of a riding gantry, positions the machine for the first cut. After that, it's automatic. Functions programmed on the tape include starting and stopping of the machine, igniting preheat flames, flame control and cut sequence. The tape even turns the gas supply on and off.

Range of Speeds—Cutting speeds, also controlled by the tape, can be programmed within a range of 2 ipm and 35 ipm. After a cut has been completed, the tapes can shift the machine to a new position at speeds up to 150 ipm.

The cutting machine is a rectilinear bridge-type unit. This type of design provides greater rigidity to the structure. The unit will cut two 10-ft wide plates, side by side.



VARIED INPUT: The tape system permits operator to cut straight lines and contours. Other operations such as controlling the gas system, flame, cutting speed and cutting sequence are punched onto the tape.

Cutting length can be altered to suit job requirements.

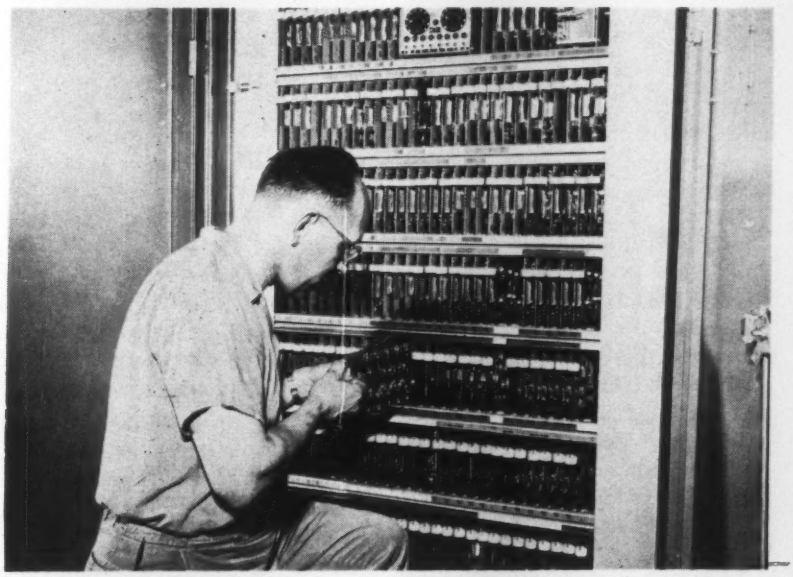
Three types of torch heads are available with the machine. One type carries a single torch which does not compensate for kerf width. A second type of head is available which will compensate for kerf. Still a third head can also be included. This one has three cutting torches for contour bevelling.

Drive System—Each side of the machine is driven by a separate gear head motor. The motors are connected by a servo-tie system to prevent skewing and to maintain precision. A drive screw extends across the front of the main bridge structure which joins the two side sections of the machine.

A motor, located on the operator side, drives the screw. The screw, in turn, drives the torch heads. It serves to position the torch heads in the "Y" axis. The machine has a continuous drive screw. One half has left-hand and the other half a right-hand thread. This permits the cutting of two plates (one the mirror image of the other).

Machines can also be supplied with a single, long lead screw if required with a right-hand thread. The drive screw can even be split in the middle, then connected together with a quick-change gear box. In this manner, the operator has the option to cut two identical parts.

READY TO COMMAND: Punch tape used on the flame-cutting system contains eight channels. The operator simply positions the machine for the first cut. From then on, all operations follow automatically. Cutting economy can be easily fed right into the fully automated setup.



INSIDE VIEW: Controls for flame cutting are similar in design to the type of numerical control system so popular in machine tools.

Semiconductors—The numerical control system contains silicon-controlled rectifiers in its static servo drives. This is the first time they have been used for this purpose. As a result, the variable-speed drives should function with a much higher degree of reliability.

What industries are logical users of the machine? Airco officials believe the system can be put to profitable use in ship construction. Other prospects include builders of both construction and electrical equipment, large and medium-sized fabricators, and builders of farm machinery and locomotives.

Retrievers Fetch Cast Parts

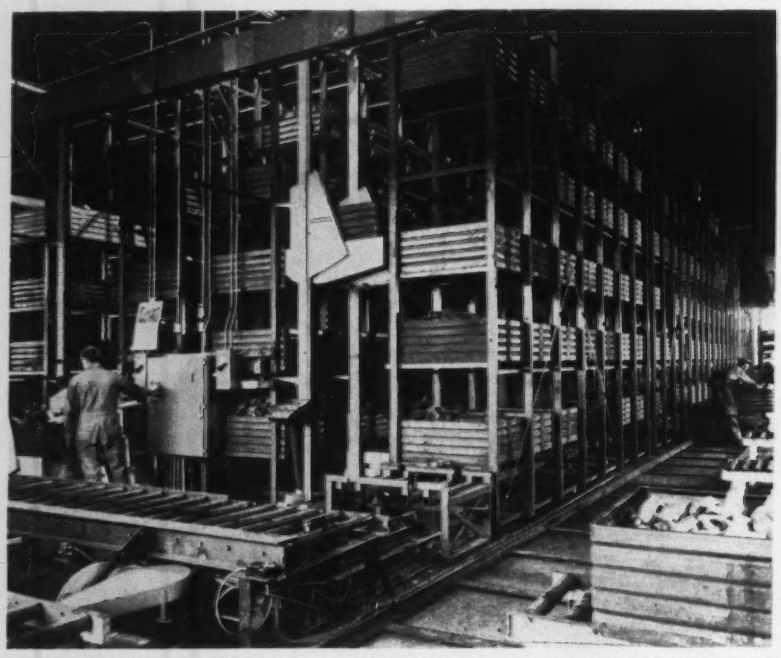
Automated System Stores Partially-Finished Castings

With powered and free-wheeling conveyors, a pushbutton system "files" as-cast parts.

In minutes, fetch carts can move these parts from storage to a final-finishing area.

■ A conveyorized storage-and-handling system eliminates finishing-room jams at the Marion Malleable Iron Works, Marion, Ind. Company officials estimate this system saves 800 manhr per week in sorting and storing heavy industrial castings.

The new setup consists of 520 keyed storage bins. Containers of castings are automatically routed to these bins. A conveyor transports the containers from a point near the heat-treat ovens to rows of storage bays. At this switching point, each container shifts to a dolly.



KEYED STORAGE: Moving up and down two 90-ft long aisles, a pair of motorized carts handle up to 50 tons of castings in an average shift. Push-button controls send the bins of castings to finishing machines.

Five High—At the proper slot in the storage bay, each container transfers to an elevator. Then the elevator carries the castings to one of five storage tiers.

Retrieving the castings is just as simple. The conveyor system transports stored containers to a point near the finishing machines.

The new system, installed by the Triax Co., Cleveland, is hailed by A. E. Salatka, Marion's vice president and general mgr. as an important company asset. Although it has been in service less than a year, he estimates savings in finishing and materials handling at better than $10 a ton.

Fool-Proof Filing—"The real advantage," Mr. Salatka cites, "is the ready accessibility of each batch of castings. This setup gives us what amounts to an almost fool-proof filing system. We save about 800 manhr every week. And," he adds, "we only need half the floor space required by our former method."

The new equipment consists of two 2000-lb capacity "retriever" units. Each operates in a 90-ft long storage aisle with 260 openings per aisle. Stored castings are available in an average cycle time of 2½ minutes.

Partially - finished castings are stored in steel boxes. Within the closed-loop system, these boxes move in or out of the storage bins or around the conveyors. They never leave this confined area.

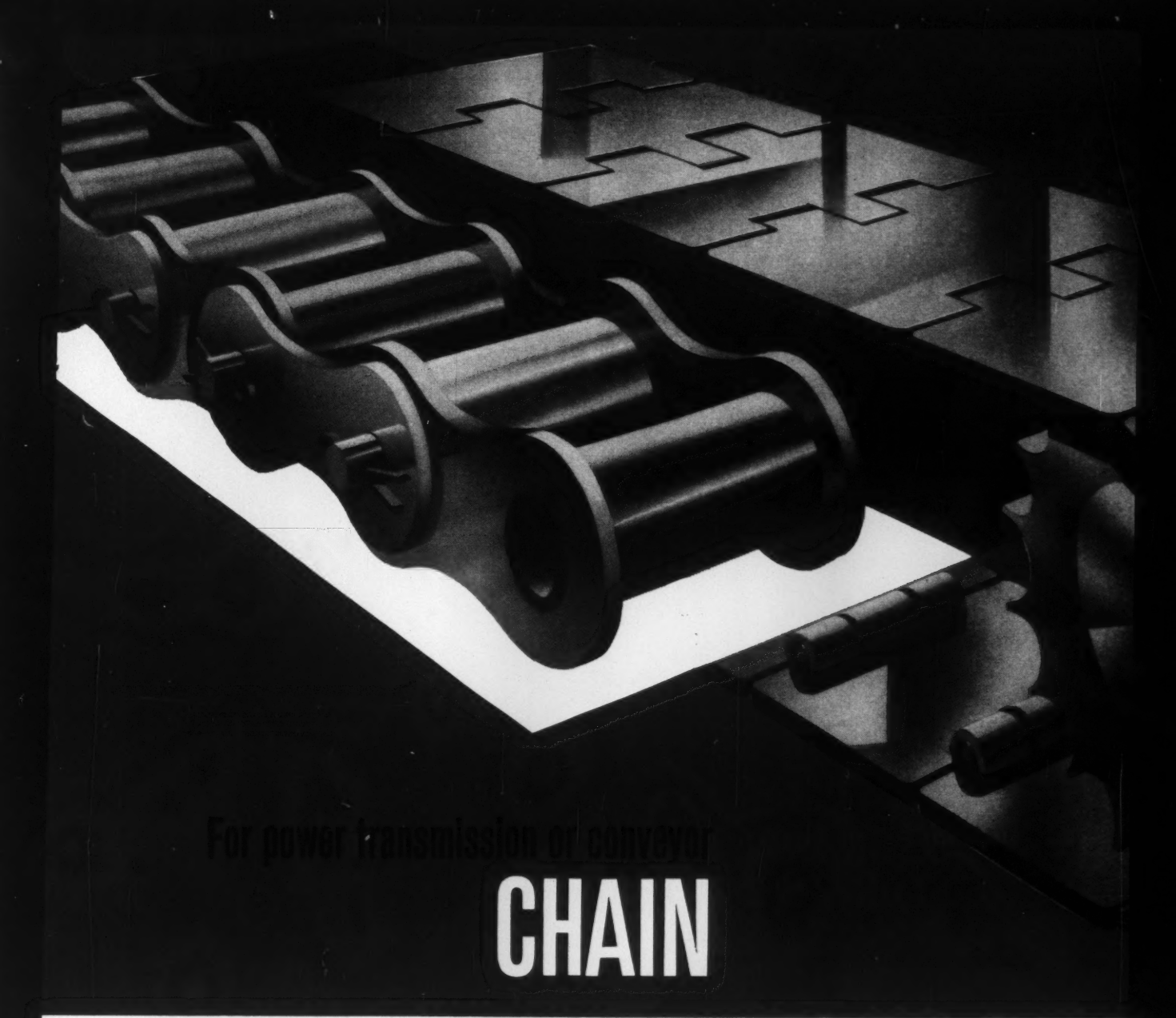
"Under the old system," says Helmut Baierschmidt, Marion's industrial engineer, "castings were stored in wheeled trucks. To fill an order, you had to hunt among the boxes. This caused lots of lost time."

Fast Deliveries—With the new system's rapid accessibility, it's economically possible to store partially-finished castings. Thus quick deliveries can be made without stocking costly finished parts.

In practice, the company loads up to 1000 lb of castings in each container. On an average shift, fifty tons move in or out of storage.

The complete system takes up 2160 sq ft of floor space. Openings measure 31 in. wide x 45 in. long x 33 in. high. This allows ample side clearance and heaping height for the 30 x 42 x 15 in. high boxes. All boxes rest directly on load-support channels in the structure.

Control consoles are single-command units. By setting finger-tip control keys, the operator places a load in storage or takes it out. He never has to leave his position at the head of the aisles. Maximum cycle time for the back bays is four minutes. Front bays take 60 seconds.



For power transmission or conveyor

CHAIN

Superior STAINLESS

foils corrosion—lengthens life

The Superior Stainless combination of higher strength for heavier loads, abrasion resistance for longer wear, and corrosion resistance for maximum service life and cleaning ease is well illustrated in these applications by Atlas Chain & Manufacturing Co. Plus values to the maker are Superior's uniform fabricating ease and dependability—prompt deliveries—close cooperation at all times. Why not enjoy these benefits for *your* stainless strip applications? Call us!

SUPERIOR STEEL DIVISION

OF

COPPERWELD STEEL COMPANY

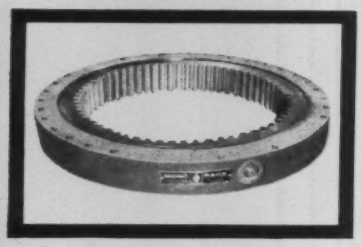
CARNEGIE, PENNSYLVANIA

For Export: Copperweld Steel International Company, New York

Stainless Steel

USE RINGS IN YOUR PRODUCT?

Amweld flash butt-welded rings can cut your costs!



Amweld flash butt-welded rings are today lowering costs on gear blanks, bearing races, frame rings. Also rings for OEM, such applications as jet aircraft engines, missiles, and scores of other applications. Savings to Amweld customers totaled over one million dollars last year alone!

Here's your opportunity to reduce the cost of your circular components and assemblies. Amweld's close-tolerance fabrication of flash butt-welded rings cuts waste of materials, cuts out unnecessary machining. And Amweld's ability to flash weld materials to Aeronautical Material Specifications offers proof of Amweld quality.

Investigate now! To see how Thew Shovel Company makes profitable use of Amweld flash butt-welded rings, mail coupon below for your free copy of Application Study R-1. Then let your Amweld representative show you how much flash butt-welded rings can cut the cost of your circular components!

AMWELD®
INDUSTRIAL PRODUCTS

Amweld supplies flash butt-welded rings for the races of "Mono-Race" connections, designed and manufactured by The Thew Shovel Company's Mono-Race Division, Lorain, Ohio. This 10 ton hydraulic crane, manufactured by Grove Manufacturing Company, Pennsylvania, is a typical application of a Mono-Race connection.

The American Welding & Manufacturing Co.
705 Dietz Road, Warren, Ohio

Yes, send Mono-Race Application Study along with full details on Amweld flash butt-welded rings as a cost reduction opportunity.

Name & Title_____
Company_____
Address_____
City_____
State_____

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy, just circle the number on the free postcard.

Roller-Chain Catalog

An illustrated roller-chain and sprocket catalog contains 106 pages of power-transmission plans and ideas. It's a must for engineers, designers and others who use power transmission drives. (Acme Chain Corp.)

For free copy circle No. 1 on postcard

Compact Solenoids

Three thought stimulators, for the engineer interested in the use of rotary solenoids, are contained in a 1-page leaflet. Line sketches show how solenoids may be used for cutting, sorting, and hole punching. (Ledex Inc.)

For free copy circle No. 2 on postcard

Air-Pollution Remedy

In three-colors, a new 12-page bulletin describes a line of electrostatic precipitators. It discusses air-pollution headaches and how to solve them with electrostatic units. (American Radiator & Sanitary Corp.)

For free copy circle No. 3 on postcard

Photovoltaic Cells

All about an improved selenium-photovoltaic cell, a new-product bulletin employs texts, photos and drawings to point out the advantages of the new selenium units. (Daystrom, Inc., Weston Instruments Div.)

For free copy circle No. 4 on postcard

Arc-Welding Machine

This new bulletin passes along information on a line of 3-phase, rectifier-type, dc arc welders. These units perform equally well in the shop, on maintenance or production jobs, or outdoors at a construction site. (The Lincoln Electric Co.)

For free copy circle No. 5 on postcard

Breakers or Switches?

Costs, sizes, installation and other features are described and illustrated in a pocket-sized comparison guide between circuit breakers and safety switches. (Westinghouse Electric Corp., Standard Control Div.)

For free copy circle No. 6 on postcard

Spray Cleaner

Spray cleaning for ferrous and non-ferrous alloys is described in a new bulletin. It gives the details on a new spray-cleaning unit that boasts quick-soil penetration, complete dispersion, and free rinsing and draining. (The Diversey Corp.)

For free copy circle No. 7 on postcard

Unit Mechanization

An approach to automation, based on "unit mechanization" of specific or related work functions, rather than the fully-automatic production-line concept, is set forth in an illustrated 12-page brochure. (Jered Equipment Co.)

For free copy circle No. 8 on postcard

Industry Standard

The Cemented Carbide Producers Assoc. announces that a new simplified-practice recommendation, listing standard cemented-carbide stock items, has just been issued by the Commodity Standards Division, Office of Technical Services, U. S. Department of Commerce.

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Control Vibration

The undesirable effects of vibration can be "designed out" of products with the aid of accurate and

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. 7/13/61

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FREE LITERATURE

economical methods outlined in a new brochure, "Vibration—master or servant?" (Rockbar Corp.)
For free copy circle No. 10 on postcard

Infrared Equipment

Here's a new brochure that covers fluid-cooling techniques as they're used in compact quartz-lamp ovens and furnaces. These units boast extremely high heat-transfer rates. (Fostoria Corp.)
For free copy circle No. 11 on postcard

Draw-Plate Catalog

The catalog gives all the dope on a line of adjustable draw plates. These units are widely used for forming accurate squares and rectangles directly from round wire. (The Fenn Mfg Co.)
For free copy circle No. 12 on postcard

Welded-Steel Tubing

More and more, heat-transfer applications are using welded carbon-steel tubing. Here's a new brochure that describes the production and testing of welded tubing. It stresses procedures which insure high quality. (Revere Copper & Brass Inc.)
For free copy circle No. 13 on postcard

Cutting-Tool Alloy

A new booklet covers the uses of a casting alloy for cutting-tool and other hard-wearing applications. Outstanding versatility makes this alloy ideal for a wide variety of machining jobs at intermediate-cutting speeds. (Vascoloy-Ramet Corp.)
For free copy circle No. 14 on postcard

End Lip-Seal Leakage

In four pages, a 2-color brochure explains the causes of lip-seal leakage, tells some principles of good sealing, and discusses a method of stopping leakage through the use of lip-seal testing machines. (General Motors Research Laboratories.)
For free copy circle No. 15 on postcard

Worm-Gear Jacks

Just issued is a 28-page catalog that gives all the details on a line of worm-gear screw jacks for leveling, adjusting, and stabilizing machinery and equipment. (The Joyce-Cridland Co.)
For free copy circle No. 16 on postcard

Truck-Leasing Plans

The 2nd edition of a popular study analyzes the merits and demerits of truck-fleet leasing plans as compared with company ownership. It also evaluates various lease plans, pointing out advantages and disadvantages of each. (Foundation for Management Research)
For free copy circle No. 17 on postcard

Rechargeable Batteries

The advantages of silver-oxide rechargeable batteries over ordinary batteries are graphically shown in a paper delivered recently by Paul I. Howard, formerly a consultant to the Atomic Energy Commission. (Yardney Electric Co.)
For free copy circle No. 18 on postcard

"Master Planner"

Here's a color wall chart that aids in scheduling equipment-shutdown maintenance activities. All items involved in the shutdown are shown at a glance. Space is also provided for listing time and manpower requirements. (Westinghouse Electric Corp.)
For free copy circle No. 19 on postcard

Sound-Data Release

This 43-page study is backed up with comparison charts and graphs. It also includes a detailed discussion of current theories of sound transmission and reduction in all types of walls. (The E. F. Hauserman Co.)
For free copy circle No. 20 on postcard

Thread Grinder

A 6-page folder tells the story of an advanced grinder. The machine handles up to 4-in. diam work with 10 in. of full-thread length. (Jones & Lamson Machine Co.)
For free copy circle No. 21 on postcard

Steelstrapper

In a new booklet, 14 application photos show an air-driven hand tool strapping products into easily handled units and bundles. A brief text describes the strapping techniques. (Acme Steel Co.)
For free copy circle No. 22 on postcard

Carbide Tools

In 36 pages, a new catalog gives all the details on a line of carbide-tipped tools, blanks, inserts and holders. (Besly-Welles Corp.)
For free copy circle No. 23 on postcard

This mark tells you a product is made of modern, dependable Steel.

it digs
it flies
it swims

Army Universal Engineer Tractor built by Hendrickson Manufacturing Company, Lyons, Illinois. Strength with light weight obtained with use of USS "T-1" Constructional Alloy Steel and USS MAN-TEN High Strength Steel.

and does a dozen other things!

The Universal Engineer Tractor, rubber tired (RT), can do the work of a dozen different machines merely by substituting interchangeable sections. Basically, it is a 250 HP steel tractor-scraper dozer that can be flown in a C-130 Aircraft (they call it UET-RT) and parachuted into a combat area, ready to operate. In addition, being sectionalized, it can be quickly disassembled for transport by other types of aircraft. The tractor, although it is lightweight for airborne use, can transport 10 cubic yards of earth at 35 MPH. It was designed by Barnes & Reinecke, Inc., Chicago engineers, to the requirements of the United States Army Engineer Research and Development Laboratories at Fort Belvoir, Virginia. Three and a half tons of weight were saved by designing the yoke, dozer arms, front and rear axle housings, and basic bowl structure with USS "T-1" Constructional Alloy Steel. "T-1" Steel's minimum yield strength of 100,000 psi permitted working stresses of 60,000 psi.

USS MAN-TEN High Strength Steel with 50,000 psi minimum yield point, in the bowl, side plates and dozer blade saved more weight. The complete unit was built tough and strong with 7,500 pounds of USS "T-1" and MAN-TEN Steels.

For other military vehicles, United States Steel makes extremely tough, rolled armor plate, in addition to a complete line of weldable, formable, high strength and alloy steels. For more information, write United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania. USS, "T-1" and MAN-TEN are registered trademarks.

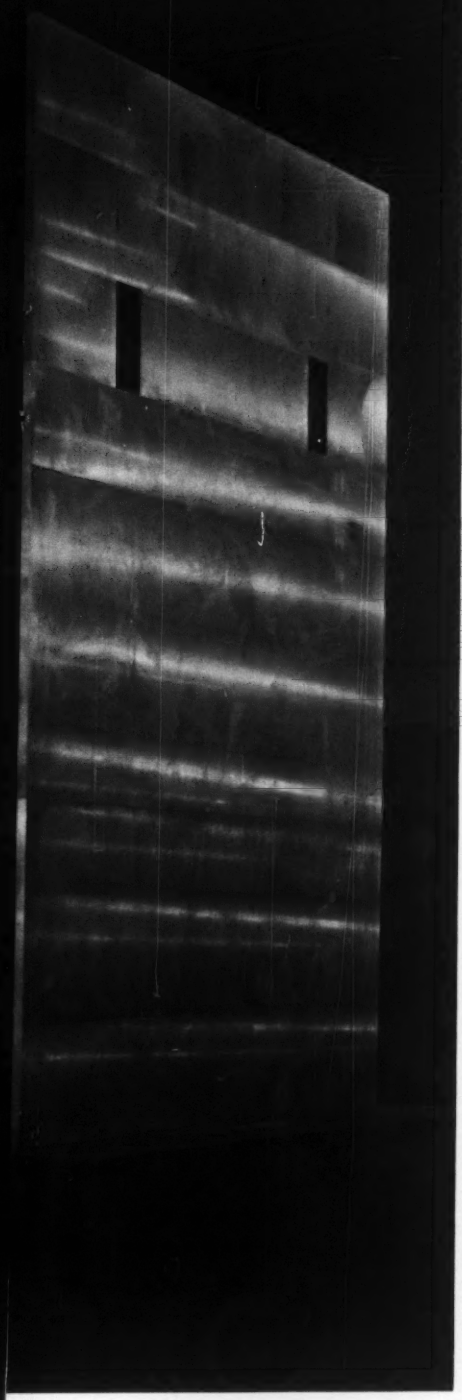
United States Steel Corporation · Columbia-Geneva Steel Division · National Tube Division Tennessee Coal and Iron Division · United States Steel Supply Division · United States Steel Export Company

USS United States Steel

Inspector measuring pole face gap to a tolerance of ±.005".

Yoke made of five forgings held together with dowels loaded to 350,000 pounds tension by a hydraulic bolt stretcher.

This mark tells you a product is made of modern, dependable Steel



259-ton magnet forgings for new 10^{15} (million billion) particles/second cyclotron

This 88-inch spiral ridge design cyclotron will permit nuclear explorations which heretofore have not been possible. The spiral ridges produce greater phase stability, prevent waste of energy. They keep the particles in focus at the tremendous speeds that are built up.

The beam current (number of particles accelerated in a given time) will be about double that of one world-famous 60-inch cyclotron and about 1,000 times that of the 184-inch synchro-cyclotron. Some million billion particles a second will be controlled by the intense, precision magnetic field created by this electromagnet.

The new machine will accelerate a variety of particles. Alpha particles (the nuclei of helium atoms) will reach a maximum of 120 million electron volts (MEV); deuterons (the nuclei of heavy hydrogen atoms) 60 MEV; and protons (the nuclei of ordinary hydrogen atoms) 30 MEV.

To meet the stability and precision requirements, designers turned to forgings. The USS Quality Forgings seen in the pictures represent about 305 tons of parts that were forged on our 10,000-ton press. After extremely accurate machining the total assembly weighed 258.8 tons.

To match magnetic properties, the pole pieces had to be from the same heat of low carbon steel, and they had to be machined, ground and polished to $\pm .005''$. The pole faces had to be parallel to within $\pm .005''$ over their entire surfaces. Steel for all 18 forgings was melted, forged, machined, heat treated and inspected at our Homestead Works. We also furnished dowels $3\frac{1}{2}''$ in diameter, hardened to Rockwell C 35 to 40, which were loaded to 350,000-pounds tension when the forgings were fastened together.

No matter what kind or size of USS Quality Forgings you buy, you get the advantages of the finest steel, the most modern equipment and the most skilled forging men in the world. Please address inquiries for our free folder on nuclear forgings to United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

United States Steel Corporation • Columbia-Geneva Steel Division • Tennessee Coal & Iron Division • United States Steel Export Company

USS TRADEMARK **United States Steel**

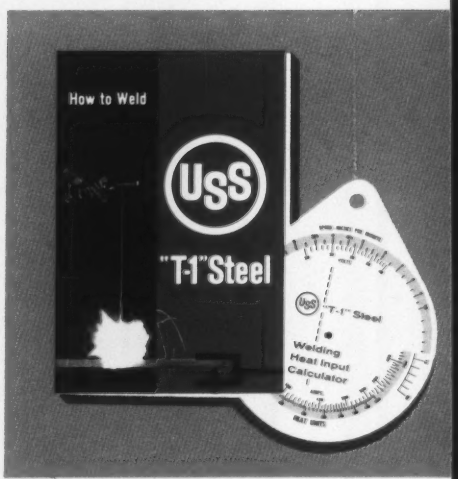
Send for new movie, "How to Weld USS 'T-1' Steels"

This new 18-minute, 16mm color motion picture shows concisely the practices involved in welding USS "T-1" Steels. If you are fabricating "T-1" Steel in your shop, this film and copies of the booklet will be a big help in demonstrating the proper technique to your welders. Fill out the coupon below and indicate the number of booklets you will need.

Included in the booklet is a handy welding heat-input calculator that helps a welder choose the proper welding machine settings. The film, together with the booklet, will help every welder to weld USS "T-1" Steels readily and successfully.

We'll gladly lend you the film and furnish enough free copies of the booklet and heat-input calculator for your shop personnel. USS and "T-1" are registered trademarks.

United States Steel Corporation • Columbia-Geneva Steel Division
National Tube Division • Tennessee Coal and Iron Division • United States Steel Supply Division • United States Steel Export Company



United States Steel

United States Steel
525 William Penn Place
Pittsburgh 30, Pennsylvania

Gentlemen:

Please lend me your 16mm color, sound movie, "How to Weld USS 'T-1' Steels." Also, send me_____booklets of the same title. I understand there is no obligation.

Name_____

Title_____

Company_____

Address_____

City_____ **Zone**_____ **State**_____

NEW PATENTS

Saves Iron-Ore Fines

Fines-handling process, J. F. Magness (assigned to Pan American Petroleum Corp.), Apr. 18, 1961. An improved method for handling iron-ore fines in fluidized-bed processes results in little or no loss of the fines in effluent gases. Canadian 618,750.

Direct Recovery

Metallurgical Process, M. C. Udy (assigned to Strategic-Udy Metallurgical & Chemical Processes Ltd., Hamilton, Ont., Canada), May 30, 1961. The direct recovery of low-carbon chromium-iron alloys and special grades of finished steel results from smelting blends of chromite and iron-oxide ores. U.S. 2,986,459.

Poppet-Valve Alloy

Steel alloy for valve members, H. Teves, E. A. Teves and M. Tausend, Apr. 6, 1961. A steel alloy suitable for poppet-valve heads consists of 0.5-1.5 pct C, 1-1.5 pct Mn, 12-30 pct Cr, 1.8-6 pct Mo, 0.4-2 pct V, and the remainder Fe and minor impurities. British 864,495.

Reduces Iron Ore

Iron-ore reduction, A. J. Jones, May 30, 1961. For partial or complete reduction of iron-oxide ores, pelletize the ore mix with a carbonaceous reducing agent, and heat in an inclined-rotary kiln. U. S. 2,986,457.

Deep-Hardening Alloy

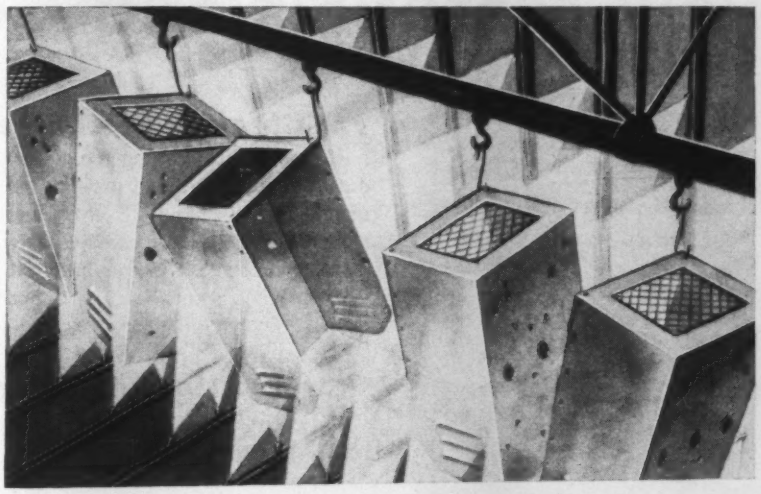
Alloy steel (assigned to The Carpenter Steel Co.), Apr. 6, 1961. An alloy steel that can be readily deep hardened in large sections comprises 0.2-0.8 pct C, 0.5-2.5 pct Mn, 0.5-1.5 pct Cr, 0.25-1.5 pct Mo, 0.65-4 pct Cu, and the remainder essentially all Fe. British 864,811.

Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.

For tough steel cleaning jobs

ask Oakite

OVER 50 YEARS CLEANING EXPERIENCE • OVER 250 SERVICE MEN • OVER 160 MATERIALS



New acid cleaner Oakite 86 gives fast smut removal . . . good paint grip

Shop smuts on steel parts disappear fast with Oakite 86 in the washing machine. A superior acid detergent, it removes all kinds of soils efficiently—really goes to work on heavily smutted steel. In addition, it forms a conversion coating on steel surfaces to give a good grip on subsequent paint coats . . . helps inhibit corrosion.

Oakite 86 also works well when aluminum, zinc, brass and terneplate pass through the washer.

And it is just the latest in a complete line of Oakite materials for spray washing machines. Others include products for high-pressure spraying, for rapid cleaning, for heavy-duty cleaning, for low-heat cleaning, for conversion coatings. Ask the Oakite man which one will work best with your machines, your metals, your specific jobs. Or, write for FREE bulletin. Oakite Products, Inc., 26 Rector Street, New York 6, N. Y.

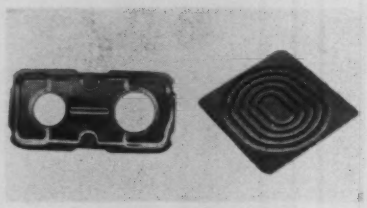
it PAYS to ask Oakite

OAKITE

over 50 Est. 1909 SCIENCE

years' leadership in industrial cleaning

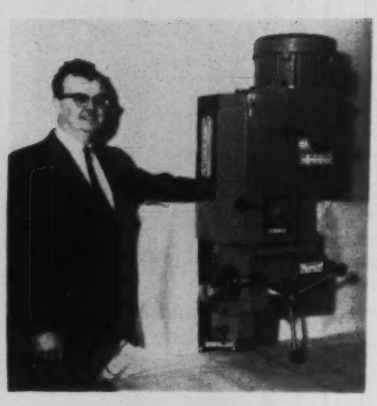
New Materials and Components



Pre-Chromed Steel Eases Part-Plating Headaches

If piece-part plating costs get out of hand, how about pre-finished metal? It cuts handling costs and slashes inventories. It also invites low-cost design. For example, the cheapest oven-liner design is a wrap-around type formed from one sheet. This method is practical with pre-finished metal. But the cost of plating a one-piece liner is too high. (Apollo Metals, Inc.)

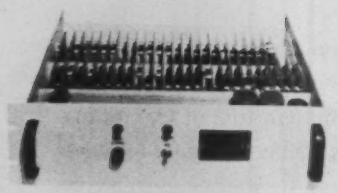
For more data circle No. 24 on postcard, p. 103



Powerful Headstocks Drill, Ream, Bore or Mill

Basically, a good headstock must be able to drill, ream, bore or mill as the need arises. This is especially true as horsepower goes up. The higher the horsepower, the more the operator has to depend on automatic controls to get good results. Here's a new milling head that keeps these operator's needs in mind. Spindle speeds are available to meet just about any requirement. And the new units come in various hp ranges. All models offer the following features: 8 or 16 spindle speeds, 3 quill feeds, manual controls through rack and worm feed, pressure lubrication, and automatic kick-out for power feeds. These features suit the heads for use on standard machines or for special setups. To promote long life, all gears are hardened and shaved. Also, prices are low. (Joseph Player)

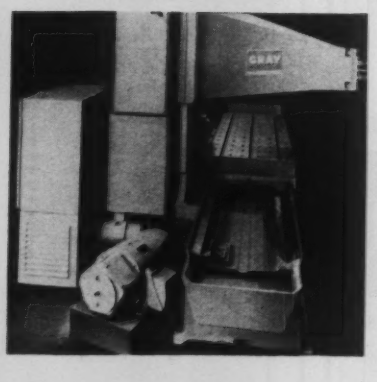
For more data circle No. 25 on postcard, p. 103



Electronic Unit "Remembers" Good and Bad Parts

Teamed up with a components-inspection system, an electronic memory wheel stores "pass" or "fail" signals. Then, when the parts reach the end of the machine, they are rejected or sorted according to the stored data. In addition, the wheel develops permanent records of all processes. This data makes inventory control, quality assurance and automatic billing a cinch. Also, the device can include a visual read-out. Thus, you can constantly monitor the status of the entire operation. (Control Equipment Corp.)

For more data circle No. 26 on postcard, p. 103



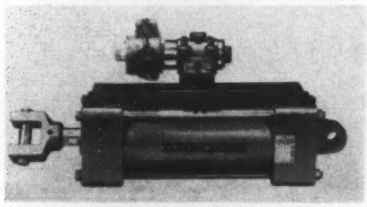
Variable-Voltage Planer Drive Takes Heavy Cuts

This new drive develops about 6600-lb pressure on a planing tool at 150 fpm. It operates at 30-300 fpm with a 6:1 gear ratio. In addition, the drive delivers 150-pct load for three minutes. This means you can plow through heavy-stock sections without slowing down. Key to performance is a reversing drive motor with low-rotor inertia. It's backed up by a 3600-rpm, unit-frame m-g set. Simple controls rely on static excitation. Should power fail, the control circuitry stops the planer instantly by dynamic braking. To ensure long life, a time-delay relay is built into the controls. This unit automatically shuts off the drive after a preset period of idle running as long as 15 minutes. (Westinghouse Electric Co.)

For more data circle No. 27 on postcard, p. 103

Air Motors

In a new air-motor design, the valve mounts on top of the cylinder. This means instant response, greater



compactness and easier upkeep. By eliminating the air-transfer tube, the new design guarantees swift, sure response. At the same time, both ends of the cylinder are free for use. In one application, where space was severely limited, the new motors made it possible to combine five distinct operations into a single automatic-processing cycle. (Air Control Div., Lehigh, Inc.)

For more data circle No. 28 on postcard, p. 103

Snappy Limit Switches

Double-pole forms are new additions to a line of precision snap-acting limit switches. They suit highly-repetitive operation in industrial uses where space is limited. The new forms are available with two normally open, two normally closed, or with two of each type of contacts.

Typical functions include controlling solenoids, opening and closing valves and pilot circuits, and operating as an interlock between a machine operation and a motor control. (General Electric Co.)

For more data circle No. 29 on postcard, p. 103

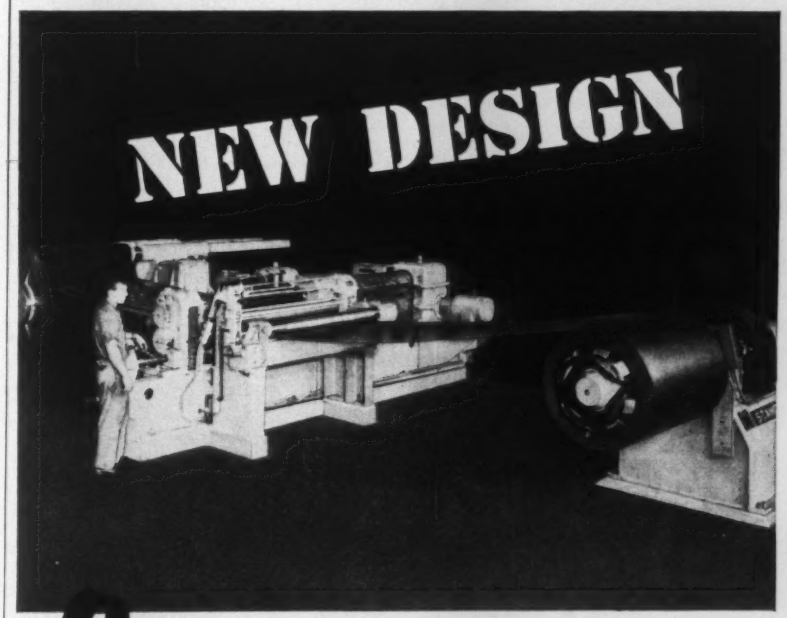
Boosts Pot Life

A black polyurethane elastomer features an unusually-long pot life at room temperature. This characteristic centers on a new inhibiting principle which controls the reaction between the polyol and the prepolymer. The user benefits because there's plenty of time to place the blended mixture. Before, the rapid reaction rate when the prepolymer was added, made placing very difficult. You can mix the new elastomer manually, or you may blend it with a slow-speed mixer. There's almost no air entrappment by either method. When cured, the product boasts high tensile strength, resilience, and excellent corrosion and abrasion resistance. (Poly Resins)

For more data circle No. 30 on postcard, p. 103

Rotary Solenoid

This new unit gets along on less input current than a transistor. At room temperature, it operates with a 0.0033-amp input current. At



Stamco equipment...cuts costs

Unit will handle coils of 20 thousand pounds maximum weight with a maximum width of 52 inches. Attractively priced. Contact our specialized sales representatives for complete information.

Stamco, Inc.
New Bremen, Ohio, U.S.A.

Slitting and Cooling Lines • Cut-to-Length Lines • Flying Shear Lines • Power Squaring Shears • Continuous Process Lines • Ferrous & Non-ferrous Mill Equipment

District Offices, Stamco Sales, Inc.
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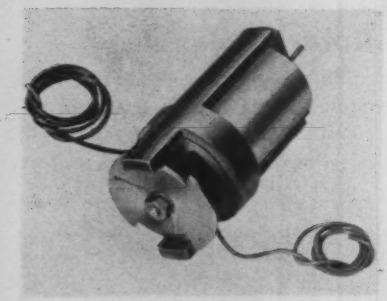
R. P. Popp, 101 Investment Building, Pittsburgh 22, Pa.
I. W. Spraitzar, 159 Main Street, Chatham, New Jersey
W. E. Heineman, 122 West Burlington Ave., LaGrange, Illinois
W. H. Millan, 11955 Shaker Boulevard, Cleveland 20, Ohio

—55°C, 0.005 amp is maximum with 29-v dc. Minimum torque is 0.005 in oz at 95°C. Voltage ranges from 25-29 v. dc. The units oper-



ate flags in indicators to MIL-1-22075. However, they suit any application requiring low input and 35° total rotation. (John Oster Mfg. Co., Avionic Div.)

For more data circle No. 31 on postcard, p. 103

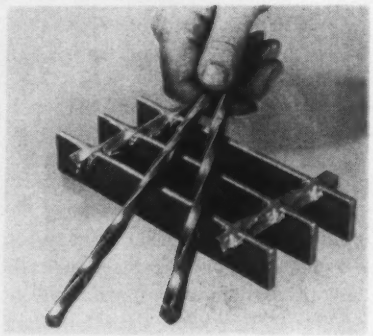
Color-Coded Conduit

Color coding is an important aid to plant maintenance men when they're working on conduit runs. It makes it easy to distinguish between electrical runs and telephone and intercom lines. It provides a safety warning, when it's used to pinpoint high-voltage lines. But, instead of painting conduit after it's installed, why not buy it already color coded? This speeds installation, avoids confusion and saves the cost of painting. New on the market is a rigid steel conduit available in all sizes with a choice of five colors. Matching elbows and fittings round out the line. The conduit is galvanized for corrosion resistance. In a final-production step, it's immersed in a pigmented poly-vinyl bath. Then the finish is baked dry and hard. (H. K. Porter Co., Inc.)

For more data circle No. 32 on postcard, p. 103

Ornamental Wire

Developed by the Steel Co. of Canada, a new type of spiralled wire offers manufacturers of ornamental- and iron-wire products a pre-formed wire material. This saves production steps in fabrication plants. Faster production and greater strength are among the benefits. The new product is ideal for grills, rail-



ings, appliances and furniture. A patterned design is also available for ornamental and appliance use. (Pittsburgh Steel Co.)

For more data circle No. 33 on postcard, p. 103

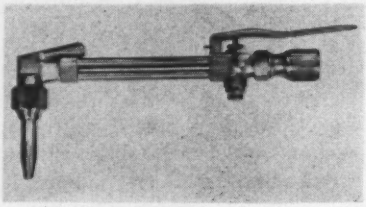
Manual Air Gaging

A new line of manual air gages offers a complete selection of adjustable units. They include bore gages available in seven sets to cover from 0.123-24 in. ID. Twelve adjustable external units cover 0-12 in. OD. Designs proved in actual use for as many as 20 years have all been adapted to air. (Standard Gage Co., Inc.)

For more data circle No. 34 on postcard, p. 103

Cutting Attachment

This new cutting attachment fits three of the company's welding torches. It employs the head-mix principle. Thus, back-firing is almost impossible. Double-silicone, O-ring seals yield a positive, finger-



tight union. The auxiliary, or preheat, oxygen valve serves as a positive shutoff. One outstanding feature is triangular-tube construction. It teams up compactness with good balance and rigidity. (The Harris Calorific Co.)

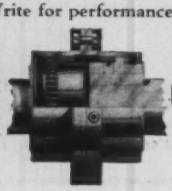
For more data circle No. 35 on postcard, p. 103

Angular Drive Design

Made Possible with

AJAX Dihedral Couplings with a wide range of angular and offset capacities provide smooth running angular drives with constant peripheral speeds in minimum space. Results include compact size, improved performance, elimination of breakdowns and reduced maintenance cost. Write for performance data.

AJAX FLEXIBLE COUPLING CO. INC.
137 Portage Road
WESTFIELD, N.Y.



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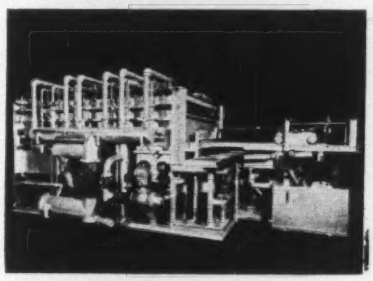
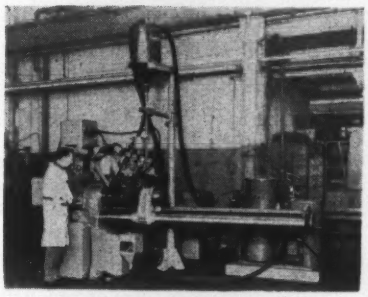
New Equipment and Machinery



Walking-Beam Furnaces Feature Radiant Firing

Units in a new line of walking-beam furnaces suit forging, forming or rolling jobs. All boast radiant-panel firing which yields uniform heat distribution, stops flame impingement, and cuts scaling to a minimum. Thus, heating efficiency is drastically increased. For smooth efficient operation, the walking-beam action uses hydraulic power. Beams are insulated and water-cooled, to restrict heat flow from the stock. Also, water-cooled discharge arms plus a conveyor provide rapid extraction. (J. A. Kozma Co.)

For more data circle No. 50 on postcard, p. 103



Cam-Controlled Machine Welds Critical Contours

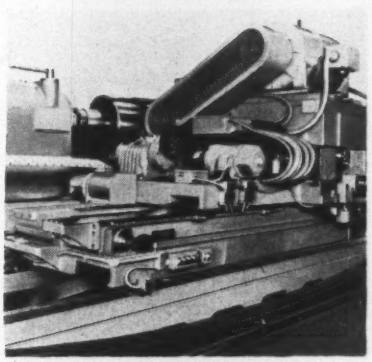
Here's a cam-controlled, universal-welding machine that automatically welds any two-dimensional, irregular contour. This includes straight or concave sections. As a result, you don't need to design a special machine every time you're faced with a tough welding job. Instead, all you need to design is a special cam. This can be done in a matter of hours. A formula and a form chart facilitate the design procedure. In fact, simple arithmetic handles the calculations. The machine itself is all mechanical. It handles most any welding process. (Expert Welding Machine Co.)

For more data circle No. 51 on postcard, p. 103

In-Line Tester Gages 4-pole Relay Performance

This versatile machine is a self-contained, manually - programmed relay tester. It's designed for use in an assembly line where calibration is necessary before a final-canning operation. Functional pushbuttons accomplish the programming. With them, you can set up all test and metering conditions. Contact-resistance measurements are made automatically with a "go-no go" read-out. In operation, the new machine tests both voltage- and current-sensitive relays. One plug-in handles 10 different tests. Lights show the operation (or failure) of each contact. (General Electric Co.)

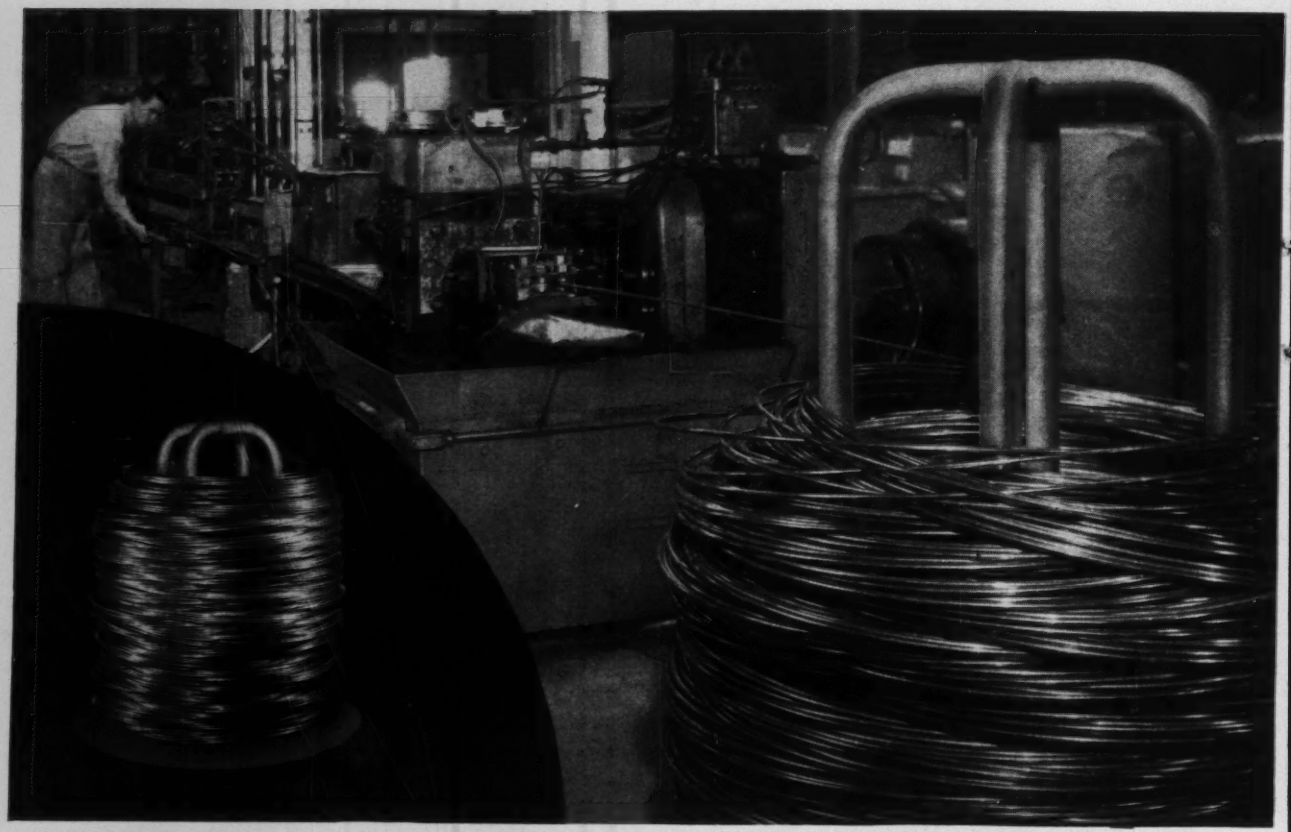
For more data circle No. 52 on postcard, p. 103

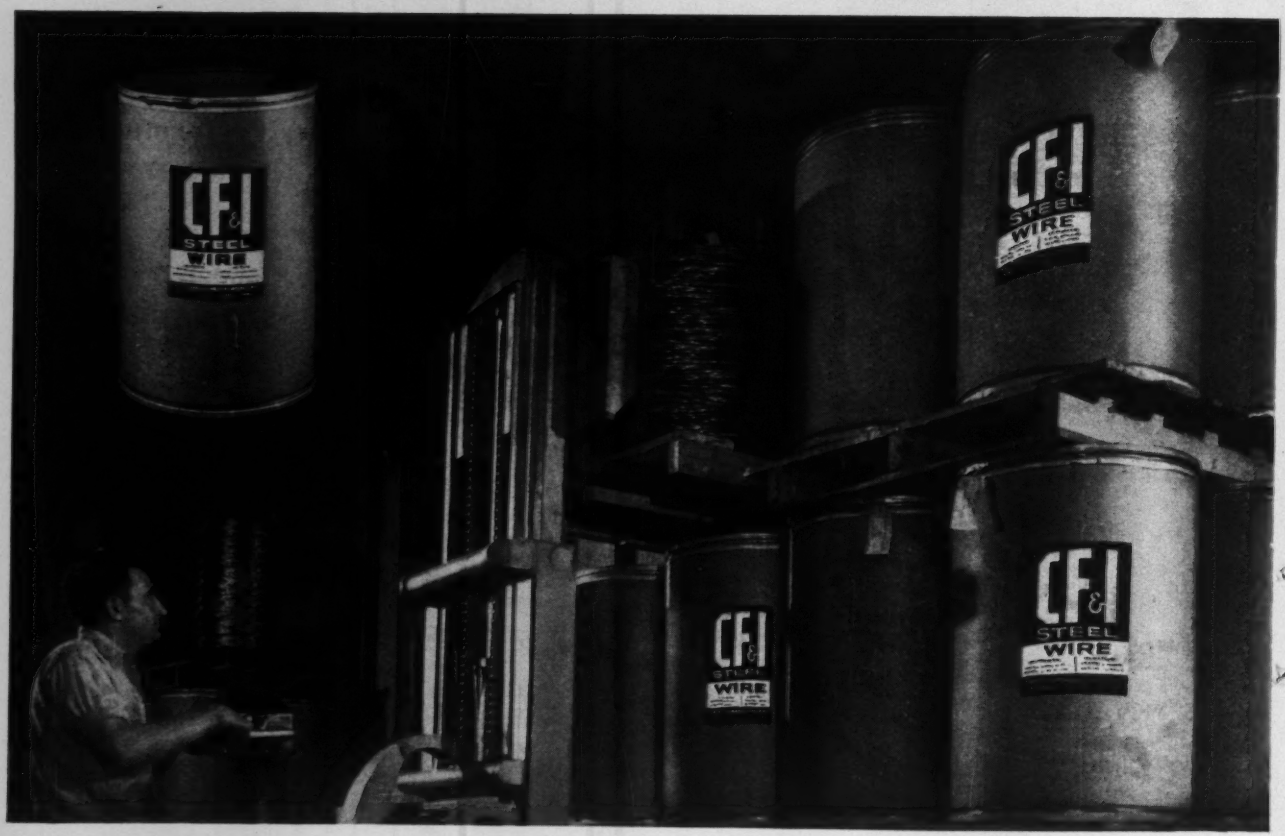


Massive Grinder Supports 200-ton Rolls

The largest roll grinder ever built in the U. S. swings rolls that are 81 ft in diameter and 30 ft between centers. It supports rolls up to 400,000-lb between centers. This machine turns out plate-mill rolls and other large rolls for the steel industry. With its 50-hp motor driving the grinding wheel through vee belts, the machine hogs off stock, or finishes rolls down to 1 microinch. It features a patented trunnion-tilt infeed. This yields control akin to that of tool-room-type machines. Since the wheelhead carriage is split, the main wheelhead lines up with tapered journals. Thus, you can grind tapered journals 48-in. long, in both directions. Gears have been eliminated. (Farrel-Birmingham Co., Inc.)

For more data circle No. 53 on postcard, p. 103




CF&I
STEEL
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WIRE

CF&I Spiders and Fibre Drums are packaged for your production

RETURNABLE SPIDERS

Here's the experience of one typical user:

> "When we used small coils, we lost several feet every time we changed a coil. Now, using CF&I Spiders, we have cut our waste 80%. We've also improved the quality of our end product because we don't have to reset the machine. CF&I Spiders have reduced our handling and storage problems, too, because you've got a lot of wire in one easy-to-handle package."

CF&I-Wickwire Returnable Spiders hold 2000 to 3000 lbs. of wire in one continuous length . . . consist of a center core welded to a heavy base plate. Available in two standard types from our mills—with core diameters of 18" and 22".

OPERATING ADVANTAGES: Increased production, decreased labor, less scrap loss, ease of handling and improved quality of end products.

FIBRE DRUMS

Here's what one satisfied user said about CF&I Fibre Drums:

> "They're an answer to the problem of unclean wire. The metal cover and locking band protect the wire from grime and other corrosive elements. The fact that they hold up to 600 lbs. of wire in one continuous length enables us to run our machines for a longer time than when we used small coils."

Fibre Drums hold 250 to 600 lbs. of wire in one continuous length . . . consist of a sturdy fibre container with center core, metal cover and locking band which protect the wire from atmosphere and dirt. The wire is directly withdrawn from the drum into your equipment. Available in full and half drums.

OPERATING ADVANTAGES:

- Cleaner wire, because the sealed drum protects the finish on the wire.
- Increased production, because of smooth pay-off and the fact that your machines have less downtime than with conventional coils.
- Less storage space required, because Fibre Drums can be stacked compactly on each other.
- Quick, easy handling . . . drums can be shipped strapped to a wooden pallet for convenient handling by a fork-lift truck.

ONLY CF&I OFFERS A TOTAL OF TEN DIFFERENT WIRE PACKAGES. You've just read how two of these packages have increased the production efficiency of leading manufacturers. One or more CF&I-Wickwire Wire packages can do the same for you. Our engineering staff will be happy to study your operation and recommend the type that best meets your requirements. For complete details, write your local CF&I sales office.

CF&I STEEL MADE IN U.S.A.

THE COLORADO FUEL AND IRON CORPORATION
Denver • Oakland • New York
Sales Offices in Key Cities

8137

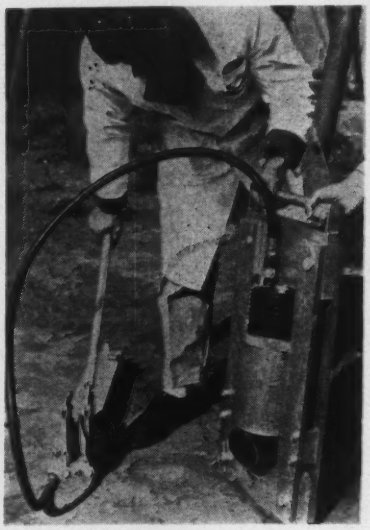
Tapered-End Mills

New additions to a cutting tool line are these tapered-end mills. They are used as die-sinking cutters and also for angle or pocket milling. Here are the details. The mills are high-speed steel, hardened and accurately ground. They have three-flute construction with straight shanks. Taper ranges from ½°-7° per side. The diameters of the small end are from 3/32-½ in. Right-hand cut and right-hand spiral are standard stock items—75 sizes in all. Left-hand cut or spiral are available on special order. (Fast-cut Tool Co.)

For more data circle No. 54 on postcard, p. 103

Speeds Pipe Repairs

With 75-ton hydraulic pressures, a pipe squeezer repairs a 4-in. ID steel pipe in 125 seconds—against 100-psi line pressures. This portable, lightweight unit is the grandfather of a new line of pipe repair

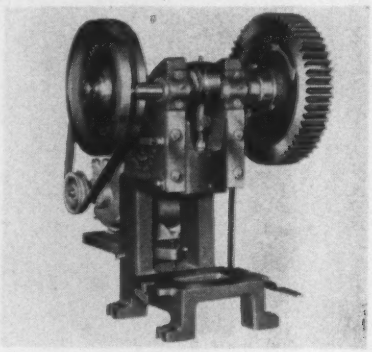


units. Other models range from 15- to 40-ton capacities. (Regent Jack Mfg. Co.)

For more data circle No. 55 on postcard, p. 103

Back-Geared Presses

These back-geared presses fill the need for special feeding, required in many deep-draw and forming operations. Their slow, powerful strokes result in better use of the flywheel inertia. On a back-geared press, strokes per minute or flywheel revolutions can be reduced without



sacrificing press-tonnage capacity. The new presses come in six models ranging in capacity from 2-25 tons. (Alva Allen Industries)

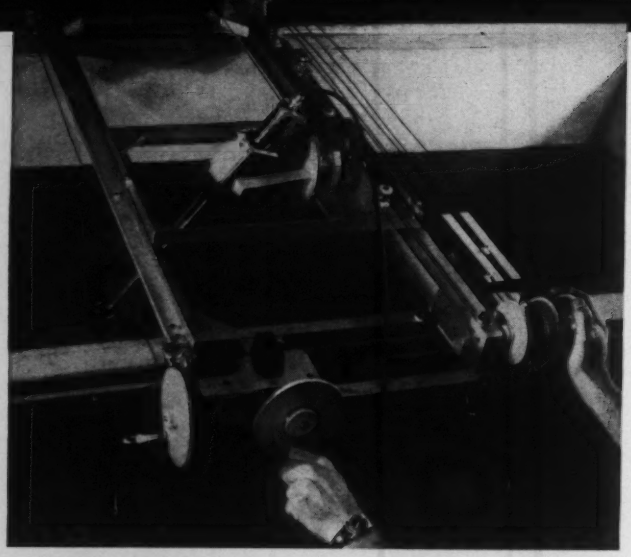
For more data circle No. 56 on postcard, p. 103

Cleans Up the Shop

A low-cost, self-contained washing unit for industrial plants handles

SCANNING BRIDGE

The Robot hands for ultrasonic flaw detection!



This "tailor-made" scanning bridge is used with the SONORAY® flaw detector. It holds the transducer in the required position and also permits its adjustment. The transducer may be raised or lowered, tilted in 2 planes or moved to any position in the tank.

Salient features:

- Ease of Operation (all controls are on one side and close to the operator)
- High-Accuracy Positioning • Light in Weight, but sturdy • Economy Priced

The scanning bridge is merely one of many outstanding examples of BRANSON ingenuity. This bridge was designed with the customer in mind! It was well-engineered at the lowest possible cost. The next time you have a problem, call BRANSON and see how fast BRANSON will find the best solution in the shortest possible time.

SINCE 1946 — THE RESPECTED NAME IN ULTRASONICS

BRANSON INSTRUMENTS, INC.

Ultrasonic Test Division

23 Brown House Road, Stamford, Conn.

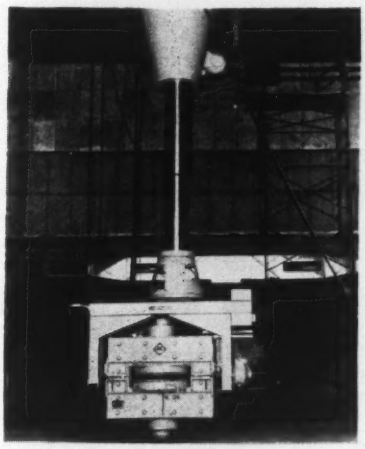
parts and assemblies, as well as floors and walls throughout the shop area. Built of non-corrosive brass and plated steel, the unit mounts in

any standard, open-top, 55-gal metal drum. It comes equipped with wide and narrow spray nozzles to increase its utility. Air supplies the power at recommended pressures of 150-175 psi. With only one moving part, the washer is easy to operate and just about maintenance free. (Weaver Mfg. Div., Dura Corp.)

For more data circle No. 57 on postcard, p. 103

Industrial Betatron

Featuring a re-designed suspension system, an industrial betatron provides accurate and rapid X-ray inspection. Welded cones replace channels at each end of standard seamless-steel telescoping tubes in the suspension system. This reduces



deflection at the upper end and provides better damping qualities. Faster positioning is the result. Another advantage is greater rigidity. Use of the cone at the lower end reduces headroom. This means more vertical travel for the magnet assembly. The machine itself gages steel sections, 1-2 in. deep as well as solid missile propellants. (Allis-Chalmers Mfg. Co.)

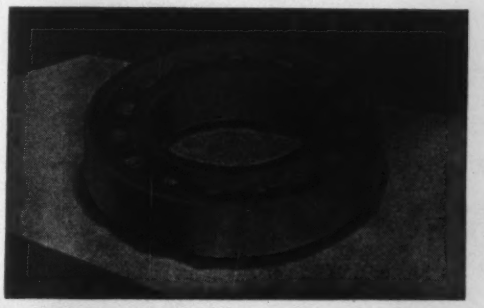
For more data circle No. 58 on postcard, p. 103

Cutting Machine

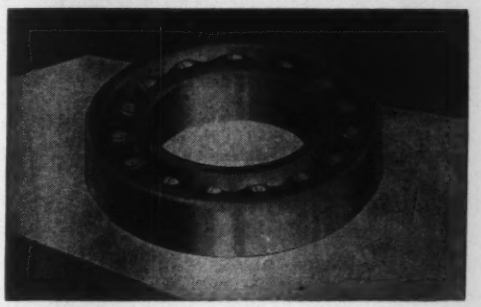
This particular cutting machine was built for the testing lab of a large abrasive-wheel manufacturer. It works as a straight chop-stroke unit; or, it oscillates from 1-100 strokes per minute. Stroke length varies from ½-6 in. Commercial uses for such a machine are many and varied. It cuts 6-in. diam solid rounds of most steel alloys at about 3 seconds per sq in. With proper work-holding fixtures, 10-in. channels are easily formed. The cut-surface quality is exceptional. In terms of micro-in. finish, the cutter gives values as low as 32-64. (Wallace Supplies Mfg. Co.)

For more data circle No. 59 on postcard, p. 103

NON-FLUID OIL
TRADE MARK REGISTERED



Ordinary Grease Works Out



NON-FLUID OIL STAYS IN BEARINGS

Use of ordinary greases for ball bearing lubrication can result in excessive wear, early failure and costly shutdown for repairs. Because of their nature they work out of ball bearings, leaving finely polished balls and races without lubrication.

NON-FLUID OIL, however, stays in bearings until entirely consumed and guarantees protective lubricant film at every point where metal-to-metal contact could set up friction. It contains nothing that can decompose and liberate fatty acids to damage bearings.

NON-FLUID OIL "stays alive" longer in bearings than ordinary grease and this fact coupled with its longer lasting properties and more effective lubrication has resulted in approval by most leading manufacturers of anti-friction bearings.

Write for a free testing sample and Bulletin No. 506

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NON-FLUID OIL is not the name of a general class of lubricants, but is a specific product of our manufacture. So-called grease imitations of NON-FLUID OIL often prove dangerous and costly.

If you're looking for the simple, economical way to meet your steel needs, it will pay you to *look locally* . . . to look to your nearest Steel Service Center. There you'll find:

PROMPT DELIVERY—usually from LOCAL stocks.

WIDE SELECTION—many types available from your LOCAL Steel Service Center.

FABRICATION ASSISTANCE—the right answers to your design and fabrication problems . . . supplied by LOCAL qualified specialists.

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Get in touch with your dependable LOCAL source for steel . . . your Steel Service Center. See your Classified Telephone Directory for listings.

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New Orders Crowd August Books

Early orders indicate August will be better than May and June in steel shipments.

Most of the early strength is in automotive, but other users are coming in. Lead times will lengthen before the month is over.

■ A surge of early orders for August delivery has put a solid base under the steel recovery late this summer.

At this point, August is now running 20 to 25 pct ahead of May and June for similar advance dates. It is still uncertain how much of this bulge is due to greater needs and how much is due just to earlier order placement.

Impact on Users—At the very least, it is the first real show of user confidence in over a year. At the best, it could be an indication of a sizable gain in production in the third and fourth quarters.

The advance ordering has two points of significance to users:

1. It means lengthened delivery dates for many products, particularly sheets.

2. Price softness, which characterized the first half steel market, will be squeezed out by the advance ordering.

To date, automakers have been responsible for most of the advance ordering for August. Apparently they are ignoring the possibility of an auto strike after the contract with the United Auto Workers runs out Aug. 31.

July Better, Too—But other steel users who sense improved business conditions this fall are also taking some long-range soundings of their steel needs.

The longer look at steel requirements is also reflected in the outlook for the remainder of July. This month is also shaping up stronger than was indicated earlier. Many steel users are taking more steel this month than they will use up in this vacation period. The effect is a lengthening out of their own inventories.

As a result, July, which could have been written off because of a multitude of seasonal factors, will now show a drop of less than 10 pct from June. In fact, production of steel this summer will probably show up better than consumption as both mills and consumers try to level out their pattern of ordering and production.

Sheets Tightest—The probable lengthening of lead time in late summer is centered in sheets. Automakers are already committing themselves for large tonnages to get a fast start on production of 1962 models. At the same time, galvanized and tinplate, although nearing the end of their strongest seasonal periods, will still reflect the demands of the construction and canning seasons.

On the price front, current market prospects are likely to mean an end to many of the concessions that have characterized the first half of 1961. Overgrading is likely to disappear and the confused stainless price situation will be stabilized. Mills and service centers are certain to reestablish normal price relationships, particularly on stainless. Spot offers of mill tonnages at less than list prices will disappear, it they have not already.

When current softness is squeezed out, and probably not before, the price policy makers will evaluate whether the time has come for an increase in base prices.

District Steel Production Indexes 1957-59=100

	Last Week	Two Weeks Ago	Month Ago	Year Ago
North East Coast	85	102	101	88
Buffalo	80	84	84	81
Pittsburgh	82	86	93	71
Youngstown	74	90	89	78
Cleveland	106	122	123	81
Detroit	125	132	134	125
Chicago	111	115	114	86
Cincinnati	105	107	118	68
St. Louis	80	87	120	64
Southern	105	113	117	95
Western	116	120	122	84
U. S. Index	95.5	103.3	106.2	83.2

Source: American Iron & Steel Institute

Steel Production, Composite Prices

Production	Last Week	Two Weeks Ago	To Date 1961	To Date 1960
(Net tons, 000 Omitted)	1,779	1,925	46,850	61,589
Ingot Index				
(1957-59=100)	95.5	103.3	93.1	122.4
Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel base (Cents per lb)	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.44	$66.44	$66.44	$66.41
Scrap No. 1 hvy (Gross ton)	$36.67	$36.83	$37.83	$31.00
No. 2 bundles	$24.17	$24.17	$25.17	$20.83

Tooling: Do You Make or Buy?

Users of mass production tooling must decide whether to make their own tools or buy from a supplier.

A new book claims it's usually best to buy.

■ Should users of mass production tooling make their own tools or buy them from outside suppliers?

According to W. A. Paton and R. L. Dixon, cost advantage goes to the independent shop. They make this point in their book "Make-Or-Buy Decisions in Tooling for Mass Production," (Bureau of Business Research, School of Business Administration, Univ. of Michigan).

The study covers the relative cost of tooling in independent and captive shops in the Detroit area. It shows the total overhead rates of job shops are "surprisingly low." Some are as low as 70 pct of direct labor costs and many are well under 130 pct including total manufacturing overhead, administration and sales expenses.

Much Higher—The authors estimate that overhead rates in large captive shops exceed those of job shops by so much that total hourly cost of production may run as high as $17.25. This is compared to $7.50 per hour in the job shop.

Reason: Greater management incentives, better motivation of skilled labor, less red tape, more intensive use of equipment, greater specialization, and less expensive facilities in the job shop.

The authors contend that captive shops incur overhead costs ranging from 250 pct to 400 pct. They cite, as an example, specific figures where the manufacturing of a given set of dies requires 30,000 labor hours (see chart).

According to the figures, a cost saving ranging from $137,250 to $292,500 is possible on a 30,000 labor hour project made under job shop conditions.

Final Price—The authors emphasize that the price of a die bought from a job shop is final once the bid from the shop is accepted. This cost assurance is missing when the job is undertaken internally.

The risk of loss through obsolescence or economic recession is also reduced if the supplier is the one to take on the investment in machinery and structures.

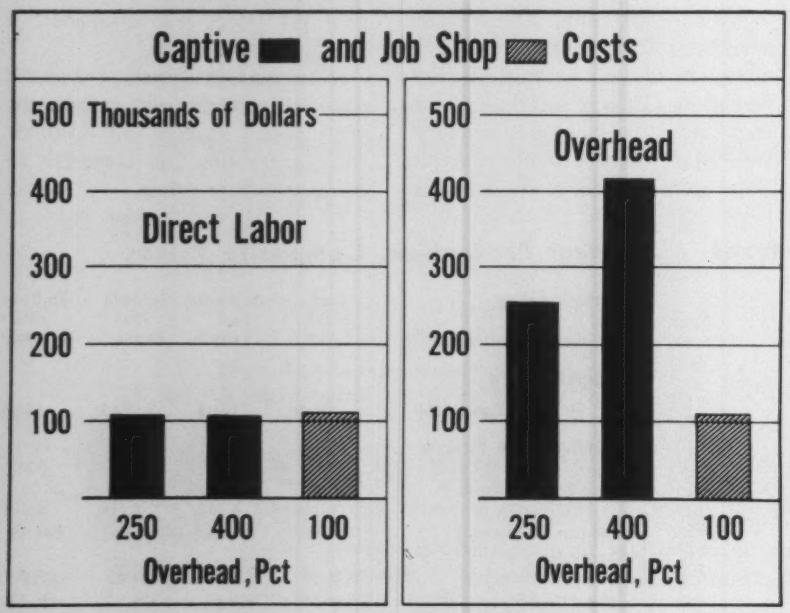
The study also points out other financial advantages of the job shop: It can reduce the customer's initial capital investment by many millions of dollars.

It's not common for the customer to make payments in advance of the final delivery. This means the release of a large sum of working capital when major orders are involved. Design and quotation services are generally rendered by job shops somewhat as a free consulting service in connection with the bid.

Insurance—How about insuring the tooling supply? The study points out that any facilities owned with the object of insuring supply should be kept idle on a standby basis. Putting such equipment to regular use defeats its availability for peak load periods and trends.

While it's true that captive shops are indispensible for maintenance of production tooling, evidence indicates they aren't a proper replacement for the job shop pool, says the authors.

It's Less Expensive to Buy



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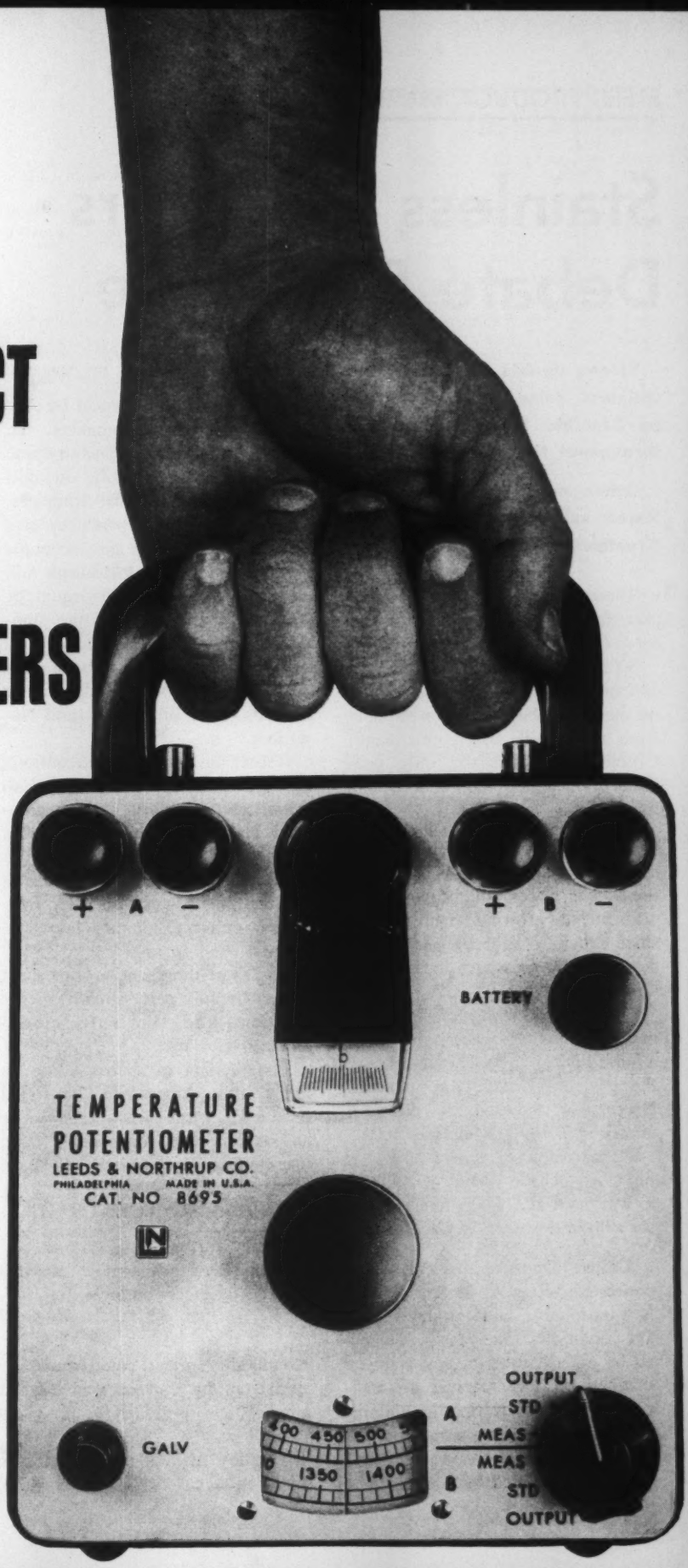

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Stainless Producers Debate Price Hike

Strong doubts exist that the stainless price increase made by Crucible Steel will spread throughout the industry.

Other mills still hadn't followed suit a week after the Crucible announcement.

■ There are doubts the stainless price increases initiated by Crucible Steel Co. last week will stick.

So far, the advances which ranged from ½¢ to 2¼¢ a lb, depending on the grade, have not won support from other mills. Early this week, Crucible remained the only producer which had announced the increases.

Quiet Week — Some industry sources believe there is still a chance the higher prices will become general. But the growing length of time since Crucible's move, effective July 5, makes the prospect increasingly unlikely.

Other mills back Crucible's statement that the advances represented a reaction to recent increases in the price of nickel. (International Nickel Co. boosted its price of nickel by 7¼¢ a lb on June 30.)

At least one stainless producer is reported to have assured customers it will hold the price line. Others show little desire to be pace setters.

United Opinion Difficult—Any concerted action to increase prices is questionable under today's market conditions. One reason advanced by mills is the fact that stainless competition has reached an emotional pitch. Everyone is blaming everyone else for price problems.

In any event, Crucible's move has thus far failed to get the unanimous support needed for success.

Sheet and Strip—Buoyed by August orders from automakers, the flat-rolled outlook is encouraging. Auto plants are already on mill books for good August tonnages. An **East Coast** sheet producer says August tonnage from auto accounts now equals June. A **Pittsburgh** mill expects August sheet to equal or top June tonnage. After the summer slowdown. **Chicago** area mills look for sheet rollings to hit a peak in September, with only minor dropoffs likely in October and November.

Bolstering the flat-rolled outlook is the demand for galvanized. Fall shipments to the farm and construction markets should be strong. Right now galvanized sheet is on long delivery. One **Eastern** mill is quoting mid-August or early September delivery, another late September.

The short-range outlook for sheet is hurt by July plant shutdowns for vacations and the auto model changeover slack.

Lengthening of delivery time is likely this August in flat-rolled products. Firm commitments by automakers and some other large users mean that others will have to follow along and place orders well in advance. Soft as the market has been, mills will not be able to take continued emergency orders and guarantee delivery in the same month.

Plates and Shapes—Construction steel orders are pacing this market. Especially active buyers are heavy machinery makers, chemical industry equipment makers, and the missile industry. Despite this, deliveries of both plates and shapes are still rapid.

August and September are described as the critical period for plate orders by one **East Coast** mill. If the market shows a strong upturn then the outlook for the balance of '61 will be improved.

Construction of roads and highways, plus industrial and commercial building, is at its seasonal peak in the **Cleveland** market area. But contractors are still fiercely competitive on bids. They quote orders on the basis of fast construction—sometimes 90 days for the steelwork. This means the steel is placed with the supply source offering the best delivery date.

Heavy structurals are being delivered on a "next rolling" basis. This can be as short as 10 days and sometimes up to a month or five weeks. Demand for heavy plate, in widths over ¾ in., is even stronger than structurals.

Bar—Advance orders for many bar mills are running about even with those of May, which was generally the peak month of the first half. But July shipments are down. **East Coast** mills are quoting delivery in 2 to 4 weeks, or less. **Chicago** area mills are having trouble filling rolling cycles. But they also expect a very good second half with a sharp pickup starting by mid-August.

Pipe and Tubing — July shipments of oil country seamless are moving at a good rate. They are even better than June for one **Pittsburgh** mill which had the second best month of the year in June. Still, orders in at the start of July were greater than those in at the start of June.

PURCHASING AGENT'S CHECKLIST

Possibility of government controls clouds business outlook for '62. p. 57

Commodity prices could move up decisively by end of year, expert predicts. p. 59

Ferroalloy makers push service to build sales. p. 60

COMPARISON OF PRICES

(Effective July 10, 1961)

Steel prices on this page are the averages of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	July 10 1961	June 30 1961	June 6 1961	July 5 1960
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	14.10
Stainl's C-R strip (No. 302)	49.50	49.50	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plates (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.60
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes.	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchant bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	46.75
Wrought iron bars	14.90	14.90	14.90	14.90
Wire: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 10 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	July 10 1961	June 30 1961	June 6 1961	July 5 1960
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.68	$70.68	$70.68	$70.57
Foundry, South Cin'ti.	71.92	71.92	71.92	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.11	70.11	70.11	70.07
Basic Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese 74-76 pct Mn. cents per lb.‡	11.00	11.00	11.00	11.00
Pig Iron Composite: (per gross ton)				
Pig iron	$66.44	$66.44	$66.44	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$35.50	$35.50	$36.50	$30.50
No. 1 steel, Phila. area	38.50	38.50	39.50	33.50
No. 1 steel, Chicago	36.00*	36.50	37.50	29.00
No. 1 bundles, Detroit	35.50	35.50	34.50	27.50
Low phos. Youngstown	40.50	40.50	40.50	33.50
No. 1 mach'y cast, Pittsburgh	45.50	45.50	45.50	48.50
No. 1 mach'y cast, Phila.	49.50	49.50	49.50	50.50
No. 1 mach'y cast, Chicago	48.50	48.50	48.50	45.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$36.67*	$36.83	$37.83	$31.00
No. 2 bundles	24.17	24.17	25.17	20.83
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.75-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	31.00	31.00	31.00	33.00
Copper, Lake, Conn.	31.00	31.00	31.00	33.00
Tin, Straits, N. Y.	116.375†	116.25*	111.125	102.625
Zinc, East St. Louis	11.50	11.50	11.50	13.00
Lead, St. Louis	11.00	11.00	11.00	11.80
Aluminum, ingot	26.00	26.00	26.00	28.10
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. * Revised.

Finished Steel Composite

Weighted index of steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strip.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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Market Reflects Little Change

The scrap market is still in its seasonal lull. There's very little change from last week.

Chicago reports some firming. But Pittsburgh says more weakness is possible.

■ The scrap market continues its seasonal lull with very little change reported from last week and very little expected before the end of July.

The only area reporting any sign of strengthening this week is Chicago. This is based largely on a slight increase in the price of No. 1 dealer bundles. But the price of No. 1 heavy melting dropped in Chicago this week, indicating a split in that market's pricing structure.

Pittsburgh reports the possibility of further weakness in the market. It will depend on dealer reaction to lower prices offered by some area mills.

Most other areas say activity is still off seasonally. Gains are expected next month.

Even though export has slowed considerably, it is still one of the factors responsible for the relatively steady market. Philadelphia dealers say export is "fair" for July. Far-west scrapmen claim exporters have maintained a "moderately active" pace. And there are reports from the Midwest this week that exporters are again becoming interested in scrap.

Pittsburgh—Supply and demand seem to be balanced at low levels. Mill requirements are down seasonally. Plant shutdowns and low prices have reduced the flow of scrap. A mill on the fringe of the district has been able to buy a limited amount of No. 1 heavy melting at $36 to the dealer. A local mill has come back into the market with prices of $36 for No. 1 dealer bundles and $23 for No. 2 bundles. The last figure would represent further weakness. However, there has not been time to test the reactions of dealers to lower prices.

Chicago — A mild firming was evident during the week. Broker prices advanced slightly on No. 1 dealer bundles. By contrast, new broker purchases of No. 1 heavy melting were reported at a price of $35. This indicates a mild split in the pricing structure. Industrial scrap collections continue to fall off. New export orders, with buying of No. 2 scrap grades most prominent, were reported at both Chicago and Milwaukee. This suggests that export buying may be reviving.

Philadelphia — This market is holding at its present level. But there isn't much domestic interest because of summer vacations. In fact, some scrap yards shut down operations last week for vacations. A large purchase of clean cast chemical borings was made last week at $3 above the last purchase.

New York—Foundries in nearby markets announced prices they would pay for cast grades. These are unchanged from last month. The overall market is unchanged. Vacations make it easier for dealers to keep busy. Most dealers expect little, if any, change from the current market through July.

Detroit — Scrap movement has slowed. But No. 1 grades can still find buyers in the export market. Local mills have bought No. 2 grades at about current prices. Mixed borings and turnings have sold for $1 over the quoted price. But machine shop turnings are dead. The cast market is a little weaker as foundries close for the summer vacations.

Cleveland—Market is still slow with only top grades moving in limited quantity. Mills take dealer yard scrap only at bargain prices or when they can't get prime scrap at their price. General level of business for the summer continues slow.

Cincinnati—Only one area mill is buying. And only small amounts are coming in at offered prices. So some weakness is setting in. Upriver demand is also very small. And foundry activity continues slow.

St. Louis—Market remains slow and dull. Prices are holding steady. But one mill is trying to buy at lower levels. Dealers have so far resisted the decline.

Birmingham—First-of-the-month buying was brisk. Prices of No. 1 heavy melting advanced $1. The price of No. 1 bundles is also up $1. But all others are unchanged. Export buying at Gulf and South Atlantic ports continues slow.

Buffalo — Some sales of turning grades were made this week at prevailing prices. Dealers seem to be marking time, however, and there are indications that prices may ease soon.

Boston—The market is described by some scrapmen as "very dull." There isn't much activity domestically or for export.

West Coast—Prices are soft. The trade doesn't look for anything exciting during July. The export market is moderately active.

Houston—The district mill entered the market and ordered a small amount of special grades. It bought at a price $2 less than the previous purchases.

SCRAP PRICES *(Effective July 10, 1961)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$35.00 to $36.00
No. 2 hvy. melting	28.00 to 29.00
No. 1 dealer bundles	36.00 to 37.00
No. 1 factory bundles	43.00 to 44.00
No. 2 bundles	24.00 to 25.00
No. 1 busheling	35.00 to 36.00
Machine shop turn.	14.00 to 15.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	18.00 to 19.00
Low phos. punch'gs plate	42.00 to 43.00
Heavy turnings	30.00 to 31.00
No. 1 RR hvy. melting	40.00 to 41.00
Scrap rails, random lgth.	46.00 to 47.00
Rails, 2 ft and under	50.00 to 51.00
RR specialties	44.00 to 45.00
No. 1 machinery cast.	45.00 to 46.00
Cupola cast.	37.00 to 38.00
Heavy breakable cast.	33.00 to 34.00
Stainless	
18-8 bundles and solids	185.00 to 190.00
18-8 turnings	110.00 to 115.00
430 bundles and solids	85.00 to 90.00
410 turnings	55.00 to 60.00

Chicago

No. 1 hvy. melting	$35.00 to $37.00
No. 2 hvy. melting	30.00 to 31.00
No. 1 dealer bundles	36.50 to 37.50
No. 1 factory bundles	41.00 to 42.00
No. 2 bundles	22.00 to 23.00
No. 1 busheling	36.00 to 37.00
Machine shop turn.	15.00 to 16.00
Mixed bor. and turn.	17.00 to 18.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Low phos. forge crops	44.00 to 45.00
Low phos. punch'gs plate, ¼ in. and heavier	44.00 to 45.00
Low phos. 2 ft and under	41.00 to 42.00
No. 1 RR hvy. melting	40.00 to 41.00
Scrap rails, random lgth.	46.00 to 47.00
Rerolling rails	58.00 to 60.00
Rails 2 ft and under	48.00 to 49.00
Angles and splice bars	44.00 to 45.00
RR steel car axles	58.00 to 59.00
RR couplers and knuckles	43.00 to 44.00
No. 1 machinery cast.	48.00 to 49.00
Cupola cast.	42.00 to 43.00
Cast iron wheels	34.00 to 35.00
Malleable	46.00 to 47.00
Stove plate	36.00 to 38.00
Steel car wheels	42.00 to 43.00
Stainless	
18-8 bundles and solids	185.00 to 190.00
18-8 turnings	105.00 to 110.00
430 bundles and solids	90.00 to 95.00
430 turnings	50.00 to 55.00

Philadelphia Area

No. 1 hvy. melting	$38.00 to $39.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 dealer bundles	42.00 to 43.00
No. 2 bundles	25.00 to 26.00
No. 1 busheling	42.00 to 43.00
Machine shop turn.	13.00 to 14.00
Mixed bor. short turn.	16.00 to 17.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	19.00 to 20.00
Clean cast. chem. borings	29.00 to 30.00
Low phos. 5 ft and under	42.00 to 43.00
Low phos. 2 ft punch'gs	44.00 to 45.00
Elec. furnace bundles	43.00 to 44.00
Heavy turnings	27.00 to 28.00
RR specialties	42.00 to 43.00
Rails, 18 in. and under	52.00 to 54.00
Cupola cast.	39.00 to 40.00
Heavy breakable cast.	39.00 to 40.00
Cast iron car wheels	40.50 to 41.50
Malleable	48.00 to 49.00
No. 1 machinery cast.	49.00 to 50.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	27.50 to 28.50
No. 1 dealer bundles	33.00 to 34.00
No. 2 bundles	19.00 to 20.00
Machine shop turn.	9.00 to 10.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Low phos. 18 in. and under	39.00 to 40.00
Rails, random length	42.00 to 43.00
Rails, 18 in. and under	46.00 to 47.00
No. 1 cupola cast.	33.00 to 34.00
Heavy breakable cast.	30.00 to 31.00
Drop broken cast.	44.00 to 45.00

Youngstown

No. 1 hvy. melting	$38.00 to $39.00
No. 2 hvy. melting	27.50 to 28.50
No. 1 dealer bundles	38.00 to 39.00
No. 2 bundles	24.00 to 25.00
Machine shop turn.	15.00 to 16.00
Shoveling turnings	18.00 to 19.00
Low phos. plate	40.00 to 41.00

Cleveland

No. 1 hvy. melting	$34.50 to $35.50
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	34.50 to 35.50
No. 1 factory bundles	41.50 to 42.50
No. 2 bundles	22.50 to 23.50
No. 1 busheling	34.50 to 35.50
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	16.00 to 17.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	16.00 to 17.00
Cut structural & plates, 2 ft & under	39.50 to 40.50
Low pros. punch'gs plate	35.50 to 36.50
Drop forge flashings	34.50 to 35.50
Foundry steel, 2 ft & under	34.00 to 35.00
No. 1 RR hvy. melting	39.00 to 40.00
Rails 2 ft and under	49.00 to 50.00
Rails 18 in. and under	49.00 to 50.00
Steel axle turnings	27.00 to 28.00
Railroad cast.	48.00 to 49.00
No. 1 machinery cast.	48.00 to 49.00
Stove plate	39.00 to 40.00
Malleable	51.00 to 52.00
Stainless	
18-8 bundles	170.00 to 175.00
18-8 turnings	100.00 to 105.00
430 bundles	70.00 to 75.00

Buffalo

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 busheling	31.00 to 32.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	24.00 to 25.00
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	14.00 to 15.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	15.00 to 16.00
Low phos. plate	37.00 to 38.00
Structurals and plate, 2 ft and under	39.00 to 40.00
Scrap rails, random lgth.	38.00 to 39.00
Rails 2 ft and under	48.00 to 49.00
No. 1 machinery cast.	43.00 to 44.00
No. 1 cupola cast.	37.00 to 38.00

St. Louis

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	28.00 to 29.00
Foundry steel, 2 ft	31.00 to 32.00
No. 1 dealer bundles	34.00 to 35.00
No. 2 bundles	23.00 to 24.00
Machine shop turn.	13.50 to 14.50
Shoveling turnings	15.50 to 16.50
Cast iron borings	21.00 to 22.00
No. 1 RR hvy. melting	36.00 to 37.00
Rails, random lengths	39.00 to 40.00
Rails, 18 in. and under	44.00 to 45.00
RR specialties	40.00 to 41.00
Cupola cast.	37.00 to 38.00
Heavy breakable cast.	32.00 to 33.00
Stove plate	32.00 to 33.00
Cast iron car wheels	34.00 to 35.00
Rerolling rails	55.00 to 56.00
Unstripped motor blocks	34.00 to 35.00

Birmingham

No. 1 hvy. melting	$37.00 to $38.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	37.00 to 38.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	38.00 to 39.00
Machine shop turn.	18.00 to 19.00
Shoveling turnings	20.00 to 21.00
Cast iron borings	10.00 to 11.00
Electric furnace bundles	38.00 to 39.00
Elec. furnace, 3 ft & under	36.00 to 37.00
Bar crops and plate	43.50 to 44.50
Structural and plate, 2 ft.	42.50 to 43.50
No. 1 RR hvy. melting	38.00 to 39.00
Scrap rail, random lgth.	41.00 to 42.00
Rails, 18 in. and under	46.00 to 47.00
Angles and splice bars	44.00 to 45.00
No. 1 cupola cast.	42.00 to 43.00
Stove plate	42.00 to 43.00
Cast iron car wheels	34.00 to 35.00
Unstripped motor blocks	31.00 to 32.00

New York

Brokers buying prices per gross ton on cars.

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	24.00 to 25.00
No. 2 dealer bundles	18.00 to 19.00
Machine shop turnings	5.00 to 6.00
Mixed bor. and turn.	5.00 to 6.00
Shoveling turnings	7.00 to 8.00
Clean cast. chem. borings	19.00 to 20.00
No. 1 machinery cast.	38.00 to 39.00
Mixed yard cast.	34.00 to 35.00
Heavy breakable cast.	32.00 to 33.00
Stainless	
18-8 prepared solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 prepared solids	65.00 to 70.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	28.00 to 29.00
No. 1 dealer bundles	35.00 to 36.00
No. 2 bundles	21.00 to 22.00
No. 1 busheling	32.00 to 33.00
Drop forge flashings	32.00 to 33.00
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	14.00 to 15.00
Cast iron borings	13.00 to 14.00
Heavy breakable cast.	28.00 to 29.00
Mixed cupola cast.	30.00 to 31.00
Automotive cast.	39.00 to 40.00
Stainless	
18-8 bundles and solids	170.00 to 175.00
18-8 turnings	70.00 to 75.00
430 bundles and solids	70.00 to 75.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	17.00 to 18.00
No. 1 busheling	31.00 to 32.00
Machine shop turn.	4.00 to 4.50
Shoveling turnings	8.00 to 8.50
Clean cast. Chem. borings	14.50 to 15.50
No. 1 machinery cast.	39.00 to 40.00
Mixed cupola cast.	31.50 to 32.00
Heavy breakable cast.	28.00 to 28.50

San Francisco

No. 1 hvy. melting	$41.00
No. 2 hvy. melting	38.00
No. 1 dealer bundles	28.00
No. 2 bundles	25.00
Machine shop turn.	$16.00 to 17.00
Cast iron borings	16.00 to 17.00
No. 1 cupola cast.	45.00 to 46.00

Los Angeles

No. 1 hvy. melting	$40.00
No. 2 hvy. melting	37.00
No. 1 dealer bundles	28.00
No. 2 bundles	25.00
Machine shop turn.	15.00
Shoveling turnings	15.00
Cast iron borings	15.00
Elec. furnace 1 ft and under (foundry)	50.00
No. 1 cupola cast.	46.00

Seattle

No. 1 hvy. melting	$42.00
No. 2 hvy. melting	38.00
No. 2 bundles	$25.00 to 26.00
No. 1 cupola cast.	36.00
Mixed yard cast.	31.00

Hamilton, Ont.

Brokers buying prices per net ton on cars:

No. 1 hvy. melting	$31.00
No. 2 hvy. melting cut 3 ft and under	28.00
No. 1 dealer bundles	31.00
No. 2 bundles	21.00
Mixed steel scrap	23.00
Bush., new fact., prep'd	31.00
Bush., new fact., unprep'd	25.00
Machine shop turn.	8.00
Short steel turn.	12.00
Mixed bor. and turn.	12.00
Cast scrap	32.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$33.00
No. 2 hvy. melting	29.00
No. 2 bundles	22.00
Machine shop turn.	8.00
Shoveling turnings	11.00
Cut structural plate 2 ft & under	$44.00 to 45.00
Unstripped motor blocks	29.00 to 30.00
Cupola cast.	35.00 to 36.00
Heavy breakable cast.	29.00 to 30.00

Japanese Pressured To Cut Copper Duty

Commerce Dept. stepped into the copper picture when Japan's Prime Minister visited the U. S.

It wants the Japanese to lower the barriers against selling U. S. copper in Japan.

■ When Japanese Prime Minister Hayato Ikeda visited the U.S. recently, he called on William Meissner at the Commerce Dept.

Mr. Meissner is director of the copper div., Business & Defense Services Administration. To some extent, he is a spokesman for the U.S. copper industry in international affairs.

Secret Talks—What was said there remains a secret. But here's what some sources say went on:

"Commerce Dept. read the riot act to Mr. Ikeda," reports a very reliable source. "And it was well prepared for the meeting with a large stack of facts and figures."

What does Commerce Dept. want?

"It warns the Japanese to let down the barriers against selling U. S. copper in Japan."

10 Pct Duty—The duty on bringing refined copper into Japan is 10 pct ad valorem. And, perhaps even more important, imports are subject to restrictions. This means they can be arbitrarily kept out.

Japanese copper consumption is growing rapidly. To meet this, the Japanese are importing copper scrap, and some ores and concentrates, to be treated domestically.

Higher Price—The demand for copper has pushed the Japanese copper price to about 37¢ per lb, 6¢ more than the U.S. price. Thus, the Japanese can afford to pay more for scrap, and they are skimming it off the U.S. market.

In the first quarter, 1961, 80.4 pct of copper alloy scrap exported from the U.S. went to Japan. In April, the percentage was 89.6 pct.

In some cases, Japanese ore buying (no duty) is crowding U.S. smelters. American Smelting & Refining Co. says the Japanese are paying more than it can for Canadian ore that Asarco has traditionally bought for its Tacoma, Wash., smelter. This, the company says, has forced it to lay off almost half the workers.

Key Objective — Commerce Dept. figures if the Japanese open the door, American copper, now in surplus supply, could easily compete and pull the Japanese price down. This would erase some advantage the secondary smelters and ore buyers now have in bidding for their raw materials.

There is little doubt the Japanese economy could absorb more copper. Consumption this year is figured at about 355,300 tons.

And some say this is artificially low, restricted by supply. Japanese refinery capacity last year was only 256,000 tons.

Ways to Act—How can the U.S. convince the Japanese government of the need for some action?

Under the Export Policy Control Act of 1949, Commerce Dept. can restrict exports of copper scrap if there is a domestic shortage. This is not as easy as it seems. Scrap dealers and exporters are getting high prices from Japanese buyers and are obviously against restrictions.

Commerce Dept. last month tightened up scrap export rules. It cut the duration of copper scrap export licenses from six to three months, and cut out extensions.

Some action is expected from the Japanese. But it may be slow in coming, and could be indecisive.

Voluntary Cuts—Some observers feel a voluntary restriction on Japanese imports of U.S. copper-base scrap is likely.

Mr. Ikeda had a long talk with Canadian Prime Minister John Diefenbaker while he was in North America. It is thought he suggested Japan could buy more Canadian copper ores and concentrates.

Tin Prices for the Week

July 3—115.875; July 5—118.00; July 6—117.25; July 7—116.875; July 10—116.375*.

* Estimate.

Monthly Average Metal Prices

(Cents per lb except as noted)

Average prices of the major nonferrous metals in JUNE based on quotations appearing in THE IRON AGE, were as follows:

Electrolytic copper, del'd Conn. Valley	31.00
Copper, Lake	31.00
Straits, Tin, New York	114.71
Zinc, E. St. Louis	11.50
Lead, St. Louis	10.80
Aluminum Ingot	26.00

Note: Quotations are on going prices.

Primary Prices

(cents per lb.)	current price	last price	date of change
Aluminum Ingot	26.00	24.70	12/17/59
Copper (E)	31.00	30.00	5/16/61
Copper CS)	31.00	30.00	5/17/61
Copper (L)	31.00	30.00	5/17/61
Lead, St. L.	10.80	11.80	12/13/60
Lead, N. Y.	11.00	12.00	12/13/60
Magnesium Ingot	36.00	34.50	8/13/56
Magnesium pig	35.25	33.75	8/13/56
Nickel	81.25	74.00	6/30/61
Titanium sponge	150-160	162-182	8/1/59
Zinc, E. St. L.	11.50	12.50	1/12/61
Zinc, N. Y.	12.00	13.00	1/12/61

ALUMINUM: 99% Ingot. COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. Other primary prices, pg. 127.

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.030-.038	.048-.061	.077-.096	.136-.250
1100, 3003	48.4	47.4	46.4	45.4
5052	55.8	53.0	50.8	49.2
6061-0	53.0	50.3	48.4	47.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-61.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.0

Screw Machine Stock—2011-T-3

Size"	7/32-5/16	11/32-23/32	3/4-1 1/16	1 3/16-1 3/4
Price	60.0	59.2	57.7	55.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	96.9	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting)..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	147	126	145
Strip, CR	133	114	145
Rod, bar, HR	116	95	116
Angles, HR	116	95	116
Plates, HR	139	116	133
Shot, blocks	...	93	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	56.13	.....	53.61	57.32
Brass, Yellow	49.27	49.56	49.21	53.43
Brass, Low	52.15	52.44	52.09	56.21
Brass, Red	53.17	53.46	53.11	57.23
Brass, Naval	53.94	60.25	47.75	58.10
Muntz Metal	51.94	.....	47.25	.....
Comm. Bz.	54.73	55.02	54.67	58.34
Mang. Bz.	57.71	61.54	51.27	.....
Phos. Bz. 5%	76.97	76.72	77.47	78.90

Free Cutting Brass Rod..... 34.77

TITANIUM

(Base Prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 32.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be $5.00
Beryllium copper, per lb conta'd Be.$43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $70.00
Bismuth, ton lots .....$ 2.25
Cadmium, del'd .....$ 1.70
Calcium, 99.9% small lots .....$ 4.55
Chromium, 99.8% metallic base ....$ 1.31
Cobalt, 97-99% (per lb) ..$1.50 to $ 1.57
Germanium, per gm, f.o.b. Miami, Okla., refined .....$29.95 to $36.95
Gold, U. S. Treas, per troy oz. $35.00
Indium, 99.9% dollars per troy oz..$ 2.25
Iridium, dollars per troy oz. ....$75 to $85
Lithium, 98% .....$9.00 to $12.00
Magnesium sticks, 10,000 lb. 57.00
Mercury dollars per 76-lb flask f.o.b. New York .....$195 to $199
Nickel oxide sinter at Buffalo, N. Y. or other U. S. points of entry, contained nickel 77.50
Palladium, dollars per troy oz..$24 to $26
Platinum, dollars per troy oz. .$82 to $85
Rhodium .....$137 to $140
Silver ingots (¢ per troy oz.) 91.375
Thorium, per kg $43.00
Vanadium .....$ 3.65
Zirconium sponge .....$ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
- No. 115 ..... 32.00
- No. 120 ..... 31.25
- No. 123 ..... 30.50

80-10-10 ingot
- No. 305 ..... 36.00
- No. 315 ..... 33.75

88-10-2 ingot
- No. 210 ..... 43.75
- No. 215 ..... 40.50
- No. 245 ..... 35.75

Yellow ingot
- No. 405 ..... 27.50

Manganese bronze
- No. 420 ..... 30.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
- 0.30 copper max. 23.75-24.25
- 0.60 copper max. 23.50-24.00

Piston alloys (No. 132 type)..25.00-26.00
No. 12 alum. (No. 2 grade) ...21.75-22.25
108 alloy 22.25-22.75
195 alloy 24.75-25.75
13 alloy (0.60 copper max.)...23.50-24.00
AXS-679 (1 pct zinc) 22.00-23.00

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½% 23.25-24.25
Grade 2—92-95% 22.00-23.00
Grade 3—90-92% 21.00-22.00
Grade 4—85-90% 20.00-21.00

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	27	26¼
Yellow brass	20⅜	18½
Red brass	23⅞	23⅛
Comm. bronze	24¾	24
Mang. bronze	19¼	18½
Free cutting rod ends	19½	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	28
No. 2 copper wire	26
Light copper	23¾
*Refining brass	24¾
Copper bearing material	23¾

*Dry Copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire	28
No. 2 copper wire	26
Light copper	23¾
No. 1 composition	23
No. 1 comp. turnings	22½
Hvy yellow brass solids	18
Brass pipe	16½
Radiators	19
Aluminum	
Mixed old cast.	12½—13
Mixed new clips	14½—15
Mixed turnings, dry	13½—14

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire	24	—24½
No. 2 copper wire	22	—22½
Light copper	19¾	—20¼
Auto radiators (unsweated)	16	—16½
No. 1 composition	20½	—21
No. 1 composition turnings	20	—20½
Cocks and faucets	16½	—17
Clean heavy yellow brass	14¼	—14¾
Brass pipe	16½	—17
New soft brass clippings	18	—18½
No. 1 brass rod turnings	16½	—17

Aluminum

Alum. pistons and struts	7	— 7½
Aluminum crankcase	9½	—10
1100 (2s) aluminum clippings	12¼	—12¾
Old sheet and utensils	9½	—10
Borings and turnings	4½	— 5
Industrial castings	10	—10½
2020 (24s) clippings	11	—11½

Zinc

New zinc clippings	5	— 5¼
Old zinc	3	— 3¼
Zinc routings	1¾	— 2
Old die cast scrap	1¾	— 2

Nickel and Monel

Pure nickel clippings	56	—58
Clean nickel turnings		43
Nickel anodes	56	—58
Nickel rod ends	56	—58
New Monel clippings	26	—26½
Clean Monel turnings	18½	—19
Old sheet Monel	25	—25½
Nickel silver clippings, mixed		20
Nickel silver turnings, mixed		17

Lead

Soft scrap lead	7¼	— 7¾
Battery plates (dry)	3	— 3¼
Batteries, acid free	2	— 2¼

Miscellaneous

Block tin	90	—92
No. 1 pewter	65	—67
Auto babbitt	46	—47
Mixed common babbitt	10	—10½
Solder joints	15	—15½
Small foundry type	9	— 9½
Monotype	9¼	— 9¾
Lino. and stereotype	8½	— 8¾
Electrotype	8	— 8¼
Hand picked type shells	5¾	— 6¼
Lino. and stereo. dross	1¾	— 2¼
Electro dross	2½	— 3

(Effective July 10, 1961)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES, STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$99.50 *A2*	$121.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*	8.10 *P2*	5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.425 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1, P11, B9*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3, Y1*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Struthers, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*		5.50 *Y1*			5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, N. Castle, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *B4, M10*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, City, Ala. Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras.

(Effective July 10, 1961)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Electro-galvanized	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.		Coke▲ *1.25*-lb. base box	Electro▲▲ *0.25*-lb. base box	Thin *0.25* lb. coating in coils
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*					7.525 *B3*	9.275 *B3*	6.40 *W6*	†Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price 0.75 lb./0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. ▲ COKES: 1.50-lb. add 25¢. ▲▲ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		Prices are for 50 lb. base box; for 45 lb. deduct 15¢; for 55 lb. add 15¢; for 60 lb. add 30¢.
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*					7.575 *A2*					
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*					7.575 *U1*	9.325 *U1*			$9.10 *U1*	$6.25 *U1*
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*		6.775 *B3*		7.525 *B3*	9.275 *B3* 10.025 *B3**	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	$6.25 *B3*
	Worcester, Mass.									6.70 *A5*			
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*		6.775 *A7*		7.525 *A7*					
	Canton-Massillon, Dover, Canfield, Ohio			6.875 *R1, R3*	7.50 *C19*								
	Chicago, Joliet, Ill.	5.10 *W8, A1*						7.525 *U1, W8*		6.40 *A5, R3, W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*		7.65 *R3*	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*	6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*					7.525 *G3*	9.275 *G3*				
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3, Y1*	6.275 *U1, I3, Y1*	6.875 *U1, I3*		6.775 *U1, I3, Y1*	7.225 *U1*	7.525 *U1, Y1, I3*	9.275 *U1, Y1*	6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1 Y1,*	$6.25 *U1, I3*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*				7.225 *E2*						
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	7.225 *A7*	6.775 *A7*	7.225 *A7*						
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3*	7.65 *R3*	6.775 *S1*	7.225 *S1*†† *R3*	7.525 *R3, S1*	9.275 *R3*			$9.10 *R3*	
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	5.10 *U1, J3, P6*	6.275 *U1, J3, P6*	6.875 *U1, J3*	7.50 *E3*	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3* 10.125 *U1, J3**	6.40 *A5, J3, P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	$6.25 *U1, J3*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3, W5*	6.875 *W3, W5*	7.50 *W3*		7.225 *W3*	7.525 *W3*	9.275 *W3*		$10.40 *W5, W3*	$9.10 *W5, W3*	$6.40 *W5*** $6.25 *W3*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*			6.775 *Y1*		7.525 *Y1*	9.275 *Y1*	6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*					8.25 *K1*	10.40 *K1*		$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*		6.775 *T2*				6.40 *T2, R3*	$10.40 *T2*	$9.10 *T2*	$6.25 *T2*
	Houston, Texas									6.65 *S2*			

Hollowware Enameling
29 ga.—*7.85 U1* at Gary; Pittsburgh; *J3* at Aliquippa; *W5* at Yorkville; *Y1* at Indiana Harbor; *W5* at Wheeling; *7.95 G2* at Granite City.

* Hi Str. Low Alloy Galv. ** For 55 lb.; for 60 lb. add 15¢.

†† 7.425 at Sharon; Niles is 7.225.

(Effective July 10, 1961)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.		Listing reinforcing bar prices has been suspended. Major producers now quote prices only in response to specific inquiries.		6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*		7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *P2*	6.375 *P2*	7.50 *P2*	7.95 *P2*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Milton, Pa.	5.825 *M7*										
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*			6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Steelton, Pa.											
	Fairless, Pa.	5.825 *U1*										
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.							5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7, A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*		7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,I3*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*		7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*		7.90 *P3* 7.85 *P8B5H2* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8, H2* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*		7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, Y1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.											8.10 *C9*
	Sterling, Ill.	5.775 *N4*					7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*		7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Youngstown, Steubenville, O.	5.675 *U1,R3, Y1*		7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1,W5, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.375 *K1*			7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*			6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*		9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*						6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*										
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*					9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*			7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga. Jacksonville, Fla.	5.875 *A8*										8.00 *A8* 8.35 *M4*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*		8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas. Sand Springs, Okla.	5.925 *S2*			6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective July 10, 1961) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brooke Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.
B9 Barry Universal Corp., Detroit, Mich.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.
C19 Canfield Steel Co., Canfield, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.

H1 Hanna Furnace Corp., Detroit
H2 Hercules Drawn Steel Corp., Toledo, O.

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.
M10 Mill Strip Products Co., of Pa., New Castle, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery; Charge	Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
		Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structural	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	.....	.....	.....	.....
Baltimore	$.10	9.60	10.16	10.16	11.35	9.70	9.95	8.65	11.80	17.48	16.48	21.58	20.83
Birmingham		8.46	10.20	10.59	9.45	8.41	8.47	8.26	13.14	18.84	16.65	22.94	22.19
Boston**	.10	10.00	10.50	11.62	12.50	9.95	10.60	10.15	13.45	17.69	16.69	21.79	21.04
Buffalo**	.15	9.45	10.20	11.95	11.85	9.55	10.05	9.60	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	9.37	10.35	10.85	11.54	9.21	9.72	9.37	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	9.53	10.41	10.90	11.86	9.59	10.29	9.48	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	9.37[1]	10.81	11.07	11.66	9.45	10.11	9.48	11.40	17.21	16.21	21.31	20.56
Denver		11.55	12.53	13.03	13.72	11.39	11.90	11.55	12.98	.....	.....	.....	20.84
Detroit**	.15	9.63	10.61	11.20	11.91	9.58	10.29	9.68	11.16	17.38	16.38	21.48	20.73
Houston**		8.67	9.48	11.35[3]	10.23	7.91	8.31	8.08	13.10	17.50	16.55	21.55	20.85
Kansas City	.15	10.53	11.37	10.95	12.70	10.39	10.91	10.55	11.72	17.17	15.87	21.87	21.12
Los Angeles		10.35[1]	12.15	12.10	12.40	10.30	10.45	10.25	14.20	18.30	17.35	22.90	22.20
Memphis	.15	9.78	10.50	10.95	11.44	9.47	9.82	9.67	12.85	18.59	16.68	22.69	21.04
Milwaukee**	.15	9.51	10.49	10.99	11.68	9.35	9.94	9.51	11.04	17.24	16.24	21.34	20.59
New York**	.10	10.17	10.88	11.45	12.47	10.32	11.00	10.54	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	.....	.....	8.90	8.65	9.20	8.90	10.70	.....	.....	.....	.....
Philadelphia	.10	9.60	10.10	10.76	11.35	9.70	9.95	9.75	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	9.37	10.81	11.68	11.64	9.21	9.72	9.37	11.40	17.10	16.10	21.20	20.45
Portland		10.40	12.25	12.35	12.40	10.55	11.00	10.40	16.65	18.60	17.85	22.70	22.15
San Francisco	.10	10.75	11.75[2]	11.95	12.80	10.90	11.20	10.65	15.20	18.30	17.35	22.90	22.20
Seattle		11.35	12.45	13.40	12.80	10.95	11.50	10.80	16.20	18.60	17.85	22.70	22.15
Spokane	.15	11.35	12.45	13.40	12.80	10.95	11.50	10.80	16.35	17.75	17.95	21.58	22.30
St. Louis**	.15	9.57	10.73	11.23	11.74	9.43	9.95	9.59	11.43	17.48	16.48	21.58	20.83
St. Paul	.15	9.72	10.39	11.54	11.89	9.56	10.07	9.72	11.64	.....	16.69	.....	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. **These cities are on order quantity pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—⅛" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—⅝-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅝" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅝" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 13¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier: [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective July 10, 1961)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Lyles, Tenn. *T3*	.....	.....	.....	.....	73.00
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Rockwood *T3*	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	71.00†
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel.

Add $1.00 for 0.31-0.69 pct phos. Add 50¢ per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1, I4*, Toledo, *I4*, $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct; 13 to 13.5 pct; 13.5 to 14 pct, add $1. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container)

	Pct
Plain finish—packaged and bulk.	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container)

	Pct
Plain finish—packaged and bulk.	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)

	Pct
Plain finish—packaged and bulk.	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Price on application assembled to bolts.)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Bolts
Full Cartons	46	46

Machine Screws—bulk

¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 lb
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

NOTE: Ferroalloy prices are published in alternate issues.

TOOL STEEL

f.o.b. mills

W	Cr	V	Mo	Co	per lb	AISI
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective July 10, 1961)

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	25.00	28.25	26.00	29.50	32.00	29.50	47.50	38.00	46.50	—	19.25–21.50	—	19.75–21.75
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	29.25	29.25–26.75	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	35.00	35.00–31.50	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25–31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	43.50	46.75	45.00	49.50	56.75	49.50	76.75	62.25	75.25	40.25	40.25	42.50	38.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	33.25	33.25–29.75	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown. *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3***	173	190	...	...	190	9.00	9.675
Atlanta *A8***	173	191	...	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	.....	.....	.....	.....	.....	9.00	9.55
Chicago *W7*	173	.....	.....	.....	.....	9.00	9.55†
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	9.00	.....
Crawf'dav. *M4***	175	192	...	214	198	9.10	9.80
Donora Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2**	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	175	192	...	214	198	9.10	9.80††
Johnstown *B3***	173	190	177	...	196	9.00	9.675
Joliet Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo *C9**	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2****	.....	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass. *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	.....	.....	213	9.95	10.50
Rankin Pa. *A5*	173	187	.....	.....	193	9.00	9.55
So. Chicago *R3*	173	187	.....	.....	193	8.65	9.20
S. San Fran. *C6*	.....	.....	.....	236	.....	9.95	10.50
Sparrows Pt. *B3***	175	.....	.....	215	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*	179	.....	.....	.....	.....	9.30	9.85
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only. †† 0.115¢ zinc.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

STANDARD T. & C.	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50								
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Sharon *M3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50								
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Fontana *K1*	*6.25		*2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Sharon *M3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50								
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 11.50¢ per lb.

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.6
Chicago	140.0
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 6 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

	Net-Ton
Furnace, beehive (f.o.b.)	
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

IMPORTANT SAVINGS

Lower initial cost
Long life
Ultra high quality

Small Diameter
ROLLS

Special alloys with tough, fine-grained finish. Surfaces as fine as 3 micro inches RMS. Chrome plating available.

RECONDITIONING:
Rolls reconditioned like new at costs averaging 25% of new rolls. Rolls can be reconditioned several times!

Voss ENGINEERING CO.

7301 Penn Ave. Pgh 8, Pa.
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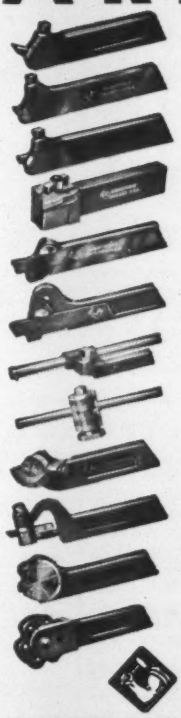
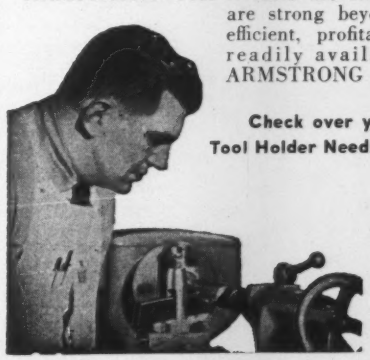
TOOL HOLDERS

A Correct Tool for Every Lathe Operation



You can save time (and money) by ensuring that your machine tools are equipped with *adequate numbers* of the correct ARMSTRONG Tool Holders. The ARMSTRONG System of Tool Holders includes correctly designed tools for *every* standard operation on lathes, shapers, and planers, and for many operations on turret lathes and screw machines. By utilizing the ARMSTRONG System of Tool Holders, you can reduce tooling costs, eliminate down time in tooling up, operate your machine tools at maximum feeds and speeds.

ARMSTRONG Tool Holders are long-lasting tools. They are strong beyond need, handy and efficient, profitable to use, and are readily available from your local ARMSTRONG distributor.



Check over your ARMSTRONG Tool Holder Needs. Write for literature.

If you do not know the name of your local ARMSTRONG Distributor, inquire when asking for literature.

ARMSTRONG BROS. TOOL CO.

5209 W. ARMSTRONG AVE.
CHICAGO 46, ILL.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.75	6.725	7.25	.....	.....	.....
Cleveland *R3*	.....	.....	.....	.....	.....	15.35
So. Chicago *R3*	.....	.....	.....	10.10	.....	.....
Ensley *T2*	5.75	6.725	.....	.....	.....	.....
Fairfield *T2*	.....	6.725	.....	10.10	6.875	.....
Gary *U1*	5.75	.....	.....	.....	6.875	.....
Huntington, *C16*	.....	6.725	.....	.....	.....	.....
Ind. Harbor *I3*	.....	.....	.....	10.10	.....	.....
Johnstown *B3*	.....	6.725	.....	.....	.....	.....
Joliet *U1*	.....	.....	7.25	.....	.....	.....
Kansas City *S2*	.....	.....	.....	10.10	.....	15.35
Lackawanna *B3*	5.75	6.725	7.25	.....	6.875	.....
Lebanon *B3*	.....	.....	7.25	.....	.....	15.35
Minnequa *C6*	5.75	7.225	7.25	10.10	6.875	15.35
Pittsburgh *S14*	.....	.....	.....	.....	.....	15.35
Pittsburgh *J3*	.....	.....	.....	10.10	.....	.....
Seattle *B2*	.....	.....	.....	.....	7.025	15.85
Steelton *B3*	5.75	.....	7.25	.....	6.875	.....
Struthers *Y1*	.....	.....	.....	10.10	.....	.....
Torrance *C7*	.....	.....	.....	.....	6.75	.....
Williamsport *S5*	.....	6.725	.....	.....	.....	.....
Youngstown *R3*	.....	.....	.....	10.10	.....	.....

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Anderson, Ind. *G4*	9.10	.....	.....	.....	.....
Baltimore, Md. *T8*	9.50	10.70	12.90	15.90	16.85
Bristol, Conn. *W12*	.....	10.70	12.90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70	.....	.....
Detroit *D1*	9.05	10.50	12.70	15.70	.....
Detroit *D2*	9.05	10.50	12.70	.....	.....
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60	15.60	.....
Franklin Park, Ill. *T8*	9.05	10.40	12.60	15.60	18.55
Harrison, N. J. *C11*	.....	.....	12.90	16.10	19.30
Indianapolis *R5*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C1*	11.15	12.60	14.80	17.80	.....
New Britain, Conn. *S7,8*	9.40	10.70	12.90	15.90	18.85
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	.....
New Castle, Pa. *M10*	8.95	10.40	12.60	15.60	.....
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	.....
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*	.....	10.70	12.90	16.10	19.30
Warren, Ohio *T4*	8.95	10.40	12.60	15.60	18.75
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *R5*	9.10	10.55	12.60	15.60	18.55

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper

Rolled elliptical, 18 in. or longer, 5000 lb lots 43.50
Electrodeposited, 5000 lb lots 36.50
OFHC anodes .....41.50 to 44.50 (depending on shape)
Brass, 80-20, ball anodes, 2000 lb or more 50.50
Zinc, ball anodes, 2000 lb lots ..... 18.75 (for elliptical add 1¢ per lb)
Nickel, 99 pct plus, rolled carbon, 5000 lb ..... .945 (Rolled depolarized add 3¢ per lb)
Cadmium, 5000 lb 1.60
Tin, ball anodes $1.26 per lb (approx.).

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum, N. Y.. 65.90
Copper sulphate, 25.2 Cu min, 6000 lbs per cwt, Detroit 17.45
Nickel sulfate, 5000 lbs 29.00
Nickel chloride, freight allowed, 100 lb 45.00
Sodium cyanide, domestic, del'd east of Rockies, 200 lb drums.... 25.80
Zinc cyanide, 100 lb, N. Y. 60.75
Potassium cyanide, 100 lb drum N. Y., del'd east of Rockies..... 46.50
Chromic acid, flake type, 10,000 lb or more, N. Y. 30.44

METAL POWDERS

(Cents per lb, f.o.b. shipping point for ton lots or over, except as noted)

Iron Powders

Molding grade, domestic and foreign, 98 pct Fe, 100 mesh bags, freight allowed east of Miss. R. 11.50
Electrolytic Iron, melting stock, 99.87 pct Fe, truckload lots 25.75
Carbonyl Iron (200 lb lots) 88.00
Welding Grades 8.10
Cutting and Scarfing Grades 9.85
Hydrogen reduced, domestic 11.25

Copper Powders

Molding Grades
Electrolytic, domestic, f.o.b. shipping point. 15.00†
Atomized ..... 44.3 to 62.3
Reduced ..... 15.00†
Chemically Precipitated 45.5
Brass, 5000-lb lots ..... 33.1 to 50.3
Bronze, 5000-lb lots ..... 51.5 to 56.8
Chromium, electrolytic 5.00
Lead ..... 7.50†
Manganese, electrolytic ... $1.00
Molybdenum .....$3.60 to $4.35
Nickel $1.15
Carbonyl Nickel, 20,000 lb lots $1.01
Nickel-Silver, 5000 lb lots.. 56.0 to 68.0
Silicon 70.00
Solder ..... 7.00†
Stainless Steel, 316 ..... $1.07
Stainless steel 304 ..... 89.00
Tin ..... 15.00†
Titanium, 99.25 + pct, per lb, f.o.b. $11.25
Tungsten, carbide grades... $3.25
Zinc ..... 19.5 to 32.7

† Plus cost of metal.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Fully Processed
Field	.....	9.875	.....
Armature	11.70	11.20	11.70
Elect.	12.40	11.90	12.40
Special Motor	.....	12.475	.....
Motor	13.55	13.05	13.55
Dynamo	14.65	14.15	14.65
Trans. 72	15.70	15.20	15.70
Trans. 65	16.30	.....	.....
		Grain Oriented	
Trans. 58	16.80	Trans. 80	19.70
Trans. 52	17.85	Trans. 73	20.20
		Trans. 66	20.70

Producing points: Aliquippa (*J3*); Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*)· Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*A9*); Niles, O. (*S1*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville, Butler (*A7*).

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*L4, P2, A3, J2*) 10 pct	15 pct	20 pct	Sheet (*I2*) 20 pct
Stainless Type	302	.....	.....	.....	37.50
	304	28.80	31.55	34.30	39.75
	316	42.20	46.25	50.25	58.25
	321	34.50	37.75	41.05	47.25
	347	40.80	44.65	48.55	57.00
	405	24.60	26.90	29.25	.....
	410	22.70	24.85	27.00	.....
	430	23.45	25.65	27.90	.....

CR Strip (S9) Copper, 10 pct, 2 sides, $43.85 ; 1 side, $36.60.

(Effective July 10, 1961)

REFRACTORIES

Fire Clay Brick

Carloads per 1000

Super duty, Mo., Pa., Md., Ky.... $185.00
High duty (except Salina, Pa., add $5.00) 133.00
Medium duty 125.00
Low duty (except Salina, Pa., add $2.00) 103.00
Ground fire clay, net ton, bulk... 22.50

Silica Brick

Mt. Union, Pa., Ensley, Ala. $158.00
Childs, Hays 163.00
Chicago District 168.00
Western Utah 183.00
California 185.00
Super Duty Hays, Pa., Athens, Tex., Windham, Warren, O. 163.00-168.00
Silica cement, net ton, bulk, Chicago 26.75
Silica cement, net ton, bulk, Ensley, Ala. 27.75
Silica cement, net ton, bulk, Mt. Union, Pa. 25.75
Silica cement, net ton, bulk, Utah and Calif. 39.00

Chrome Brick

Standard chemically bonded, Baltimore, Md. $620.00
Gary, Ind. 658.50
Standard, Pascagoula, Miss. 647.50
Standard chemically bonded, Curtiner, Calif. 119.00
Burned, Baltimore 585.00

Magnesite Brick

Standard, Baltimore $715.00
Chemically bonded, Baltimore 655.00
Chemically bonded, Pascagoula, Miss. 682.50

Grain Magnesite

St. ⅜ to ½-in. grains *Per net ton*

Domestic, f.o.b. Baltimore in bulk. $73.00
Domestic, f.o.b., Pascagoula, Miss... 80.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev.
in bulk 46.00
in sacks 52.00-54.00

Dead Burned Dolomite

F.o.b. bulk, producing points in:
Pa., W. Va., Ohio $16.75
Missouri Valley 15.60
Midwest 17.00

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

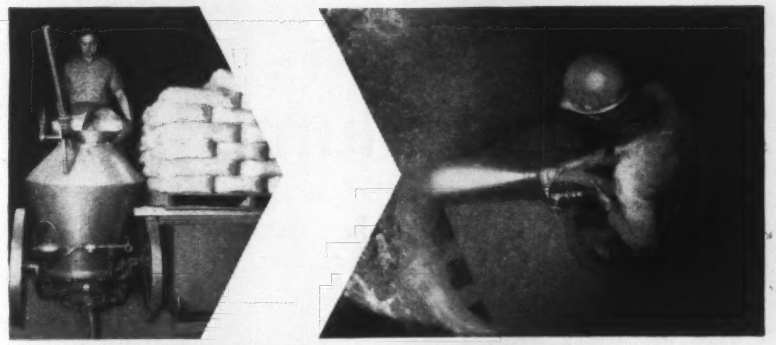
GRAPHITE Diam. (In.)	Length (In.)	Price	CARBON* Diam. (In.)	Length (In.)	Price
24	84	27.25	40	100, 110	12.50
20	72	26.50	35	110	11.20
18	72	27.50	30	110	11.70
14	72	27.25	24	72	11.95
12	72	28.25	20	90	11.55
10	60	29.50	17	72	12.10
10	48	30.00	14	72	12.55
7	60	29.75	10	60	13.80
6	60	33.25	8	60	14.25
4	40	37.00			
3	40	39.25			
2½	30	41.50			
2	24	64.00			

* Prices shown cover carbon nipples.

BOILER TUBES

$ per 100 ft. carload lots cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
Babcock & Wilcox..	2	13	40.28	47.21	35.74
Jones & Laughlin *	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
National Tube.....	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
Pittsburgh Steel...	2	13	40.28	47.21	.....
	2½	12	54.23	63.57	.....
	3	12	62.62	73.40	.....
	3½	11	73.11	85.70	.....
	4	10	97.08	113.80	.....

* Electricweld only.



THE PNEUMATIC GUN . . .

applies adhesive strength of sand-cement layer up to 10" thick in a continuous application!

Force sprays into every crack, crevice and corner for permanent strength in building, repairing or waterproofing concrete construction. Effective for sandblasting, when used without sand-cement mix. Completely dependable, both in operation and results. Has wide application in Steel Industries, Foundries, Refineries, Refractories, all Construction areas.

for details, write to

ALLENTOWN PNEUMATIC GUN COMPANY

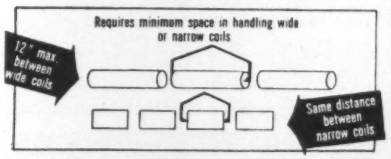
1522 WALNUT STREET, ALLENTOWN, PA.
AREA CODE 215, HEmlock 3-4168

Handling Coil Stock?

CHECK THESE C-F LIFTER ADVANTAGES

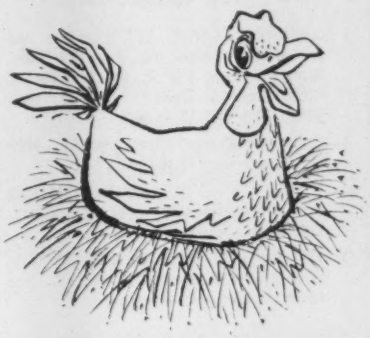
- 1 Lifter handles wide range of coil sizes
- Requires minimum of only 10" to 12" between piles —saves storage room
- 1 man operation — eliminates hookers
- Positive grip on coil — no damage to material

• C-F Coil Lifters are saving time and labor in many plants and warehouses because they can pick up, carry and set down a coil of steel faster and safer than any other method. Infinite jaw openings permit handling a very wide range of coil widths . . . carrying legs open fast, stay open until operator closes them on coil. Narrow legs require minimum space between piles – a space saving advantage. Made in motorized models for crane cab or pendant operation as well as manual types with chain wheel, in capacities from 3 tons up. Powered Rotating Heads available. Opening ranges to suit your requirements. Write for illustrated Bulletin.



CULLEN-FRIESTEDT CO.

1303 South Kilbourn Avenue • Chicago 23, Illinois



When You Have To

INNOVATE

to

AUTOMATE

Take It To Taft-Peirce

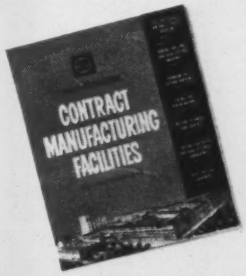
When existing equipment is not available to give you optimum efficiency in automated production lines — or when products or profits depend on special machinery to do a special job — you can be sure of a solution of your problem if you Take It To Taft-Peirce.

Taft-Peirce designers, engineers, and production experts are men of long experience in creation of specialized machinery. They are equipped to take your problem and carry it through to any step from concept to installation.

This Taft-Peirce capability has been shown in development of production equipment for widely varied industries, and its people are specialists in development of automatic machinery, gaging and controls.

Send for Bulletin

Describes Taft-Peirce contract service in detail. For action now, call or write Mr. Ford at Taft-Peirce in Woonsocket, Rhode Island.



TP 0-16

TAKE IT TO TAFT-PEIRCE

29 Mechanic Ave., Woonsocket, R. I.

AVAILABLE IMMEDIATELY

1—COMPLETE BAR MILL. 16" Breakdown and 6-Stand 10" United Mill with 900 Rolls, Re-Heat Furnace, 110 Ft. Hot Bed, Shears, Tilting Table & Cradles, Roll Shop. Main Motors 2200 volt AC current

1—15-Ton Top Charge Electric Furnace. 4000 KVA Transformer, 13,800 volts

20—8" Dia. x 4"/6"/8" Face 2-Hi Cold Mills with 25 H.P. Motors 230 v. DC. Edge Rollers, Coilers, etc.—complete

2—10" Dia. x 10"/16" Face 2-Hi Cold Mills with 40/65 H.P. Motors 230 volts DC. Edge Rollers, Coilers, etc.—complete

CURRY & HUDSON ASSOCIATES, INC.
NO. 1 GATEWAY CENTER
PITTSBURGH 22, PENNSYLVANIA

CRANES
BOUGHT & SOLD
ENGINEERED TO YOUR REQUIREMENTS
Ornitz Equipment Corp.
Industrial Engineering Service
595 Bergen St. Brooklyn 38, N. Y.
NEvins 8-3566

GUARANTEED—RE-NU-BILT
Electric Power Equipment — A. C. Motors
3 phase—60 cycle

SYNCHRONOUS

Qu.	H.P.	Make	Type	Volts	Speed
1	6000	G.E.	ATI. SP.F.	2200/6600	600
1	3500	G.E.	TS 1.0P.F.	4600/2300/4000	360
2	1750	G.E.	ATI	2300	3600
2	500	G.E.	TS 7569	2200	1200
1	400	G.E.	TS 7565	2200	1200
1	325	G.E.	ATI 1.0P.F.	440	1800
2	300	ElMach.	BRKT	2200	1200

SLIP RING

1	1750	G.E.	M-5798	4800	1800
1	800	Whse.	CW	500	1776
1	800	G.E.	MT-428	2300	450
1	600	Whse.	CW 4-32-D-15	440	1778
1	550	Whse.	CW	440	252
1	500	Whse.	CW	550	350
1	300	A.C.	ANY	440/2300	720
1	300	G.E.	MTP-561	2200	1800
1	250	G.E.	IM-16	220/440	875
1	250	Cy. Wh.	Size 29Q	2300	350
1	250	G.E.	MT-424Y	4000	257
1	200	G.E.	IE-13B	220	1890
2	200	Whse.	CW-890	2300	1775
1	200	G.E.	JM	2200	580
1	200	G.E.	IM	440	435
1	125	G.E.	MT-557	220/440	1200
1	125	A.C.	ARY	440	870
3	100	A.C.		440	695
1	100	G.E.	M-6335Z	220/440	580
1	100	Whse.	CW-754C	220/440	900

SQUIRREL CAGE

3	1500	G.E.	K	2200	3580
1	500	G.E.	FT-559AY	2200	3600
1	500	Whse.	CS-1115	2300	863/445
2	500	Whse.	CSP-583H	440	3600
4	500	A.C.	ARW	2300	3600
4	500	Whse.	CS-1216	2200	500
3	450	Ell.	F-2910	2200	1200
1	400	Whse.	CS-7151-610H	6600/4000	3565
1	300	Cont.	NL-6868	440	1780
1	300	G.E.	KT-559A	2200	1775
1	300	Whse.	CS-1003	2200	580
1	250	Whse.	CS-8758	2200	1775
2	200	Whse.	CS-8558	220/440	1750

BELYEA COMPANY, INC.
47 Howell Street, Jersey City 6, N. J.
Tel. OL 3-3334

Seasonal Slump Hits Market

Used machinery dealers say summer vacation schedules are responsible for a sales setback in May.

But they remain optimistic about the overall outlook for 1961. The tax question is still one disturbing factor.

■ After definite gains in the early months of this year, used machinery dealers suffered a sales setback in May. But they remain optimistic about the overall outlook for 1961.

According to the latest report issued by the Machinery Dealers National Assn., dollar sales in May fell 9.1 pct below April's level. The sales were 18.3 pct lower than those in the same month last year.

Used machinery sales in April had started to slow down. In fact, April's sales were less than one pct above March, 1961, and 6.4 pct below April, 1960.

The Reasons—But, dealers point out, there are definite reasons for the present sales drop. Part of the problem is seasonal. Many plants are either shut down for vacations or operating at minimum levels. This means there isn't really an immediate demand for good used machinery.

Also, the sales gains reported in the first quarter were largely due to the very weakened demand of late 1960. Last year, buyers held off from any large orders because of the pending elections and depression talk. When this was behind them, they came in with good orders.

Now the buying pattern is leveling off at a more normal pace.

However, Randy Vinson, executive director, MDNA, points out that "Inquiries to the dealer are quite firm, generally. In other words, there is a feeling among the dealers that used machinery is moving well."

Tax Amendments—Of course, one of the snags in the market right now is the pending tax amendments in Washington. Many buyers are hesitant about buying used tools before they know what the outcome of the tax talks will be. When this problem is settled, dealers feel, more buyers will come into the market.

Mr. Vinson told The IRON AGE optimism is reflected in dealer inventories. He says inventories are now at an all-time high and "this means the dealers are expecting sales to increase."

According to the MDNA report, the number of units in inventory rose 10.2 pct in May over April. The figure was also 2.2 pct higher than May, 1960. The association director says the average used machinery dealer now has 182 machines in his showroom. That's five more than the previous peak month of November, 1960.

Slow Closers—But even with all of this, says Mr. Vinson, sales are not being closed as fast as normal. This again is attributed to the summer industrial schedules and the tax problems.

Most dealers generally look for 1961 to be a better year than 1960. Mr. Vinson describes last year as "very low." He says 1961, from present indications, will definitely be stronger in dollar sales and in the number of units sold.

ELECTRICAL POWER EQUIPMENT

SQUIRREL CAGE MOTORS

HP	RPM	MAKE	VOLTS	TYPE
1500	1800	Al.-Ch.	2300	Ventilated
1250	3600	Al.-Ch.	4000	DP/PF
800	600	West	2300	CS-44
600	600	West.	2300	CS-12
500	1800	G. E.	2300	KT-565Y
500	1200	G. E.	2300	FT-567
350	1200	West.	440	CS-3255-6H
300	720	West.	2300	CSF-34
300	600	West.	440	CS-39A
250	1200	Brook (new)	220/440	R-28
200	900	West.	220/440	CS-874
150	900	G. E.	220/440	K-6334
125	900	G. E.	220/440	K-556

SLIP RING MOTORS

1000	1200	Al.-Ch.	4000	ANY
1000	900	Al.-Ch.	2300	ANY
700	720	G. E.	440	I-M
600	1800	G. E.	4160	M-6345
500	1200	G. E.	440	M-6345Z
400	1200	West.	2300	CW
400	720	G. E.	440	MT-573Y
350	1800	Al.-Ch.	2300	ARYW
300	900	G. E.	440	IM-17
300	450	G. E.	440	IM-16
250	600	West.	2300	CW-1000
200	514	West.	2300	CW-950A

MOTOR GENERATOR SETS

KW	MAKE	A.C.V.	D.C.V.
1750	G. E.	4160 2300	250 300
1000	West.	4160 2300	250
750	G. E.	4160 2300	250
600	G. E. (3 unit)	2300 440	125/250
500	G. E.	2300	250
400	Al.Ch.	2300 440	125/250
250	G. E.	2300	250
200	G. E.	2300	250
150	West	440	250

D. C. MOTORS

HP	RPM	MAKE	VOLTS	TYPE
850	250/500	West.	250	QM
400	300/900	G. M. (2)	250	D4D
300	575/1150	West.	250	CB-509
200	700	West.	250	SK-201
150	380/1000	G. E.	250	MCF
150	1150	G. E. (2)	250	RC-37
150	400/530	West.	250	SK-201
100	400/800	G. E.	250	MPC-6
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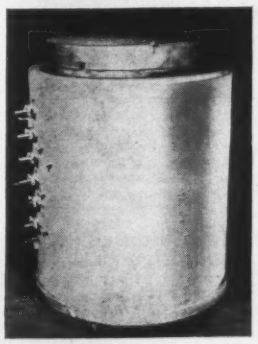

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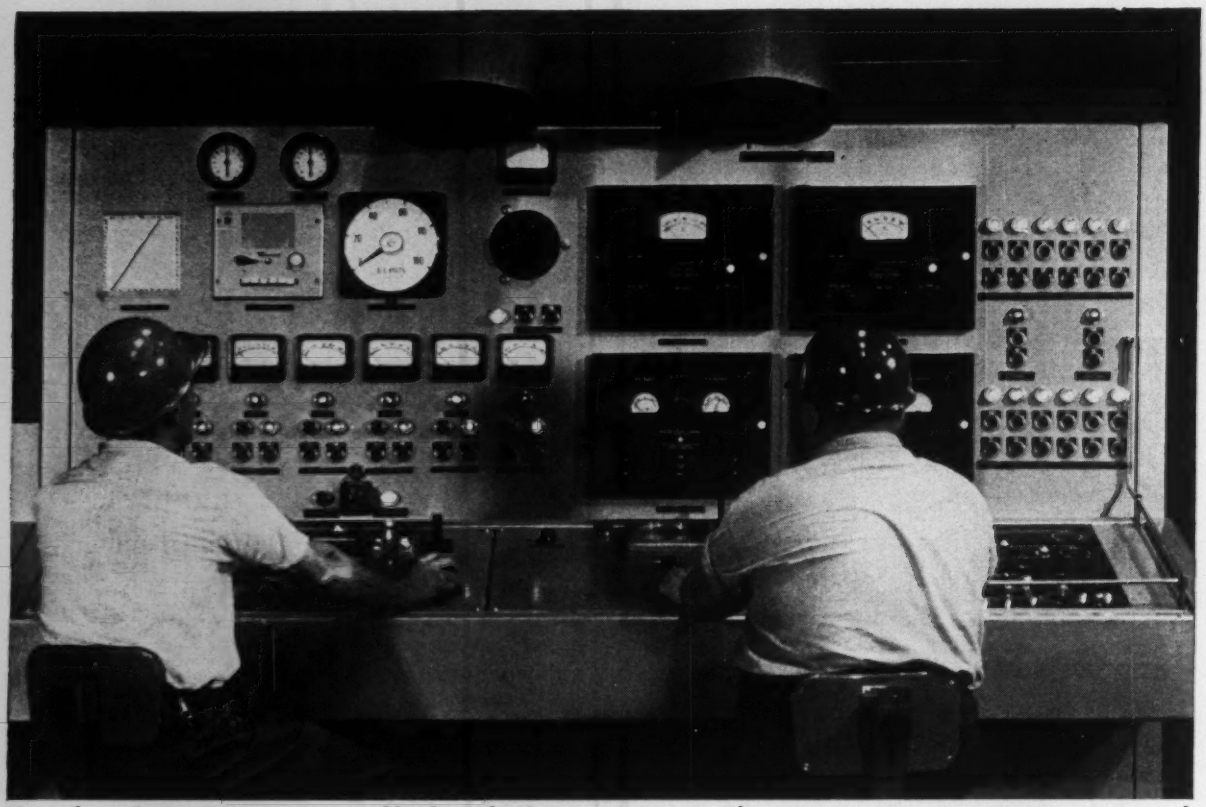

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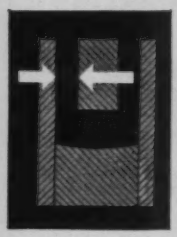

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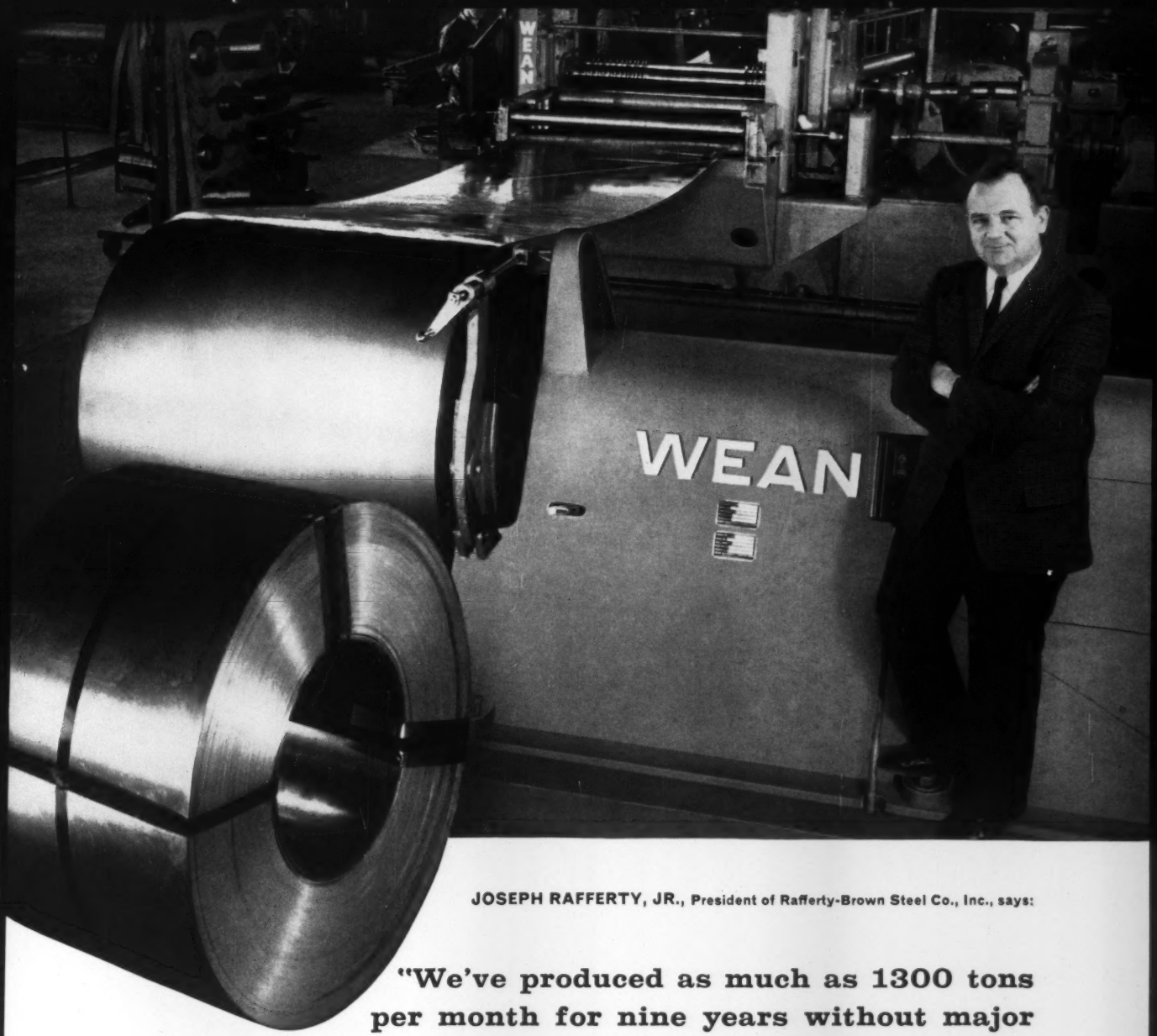

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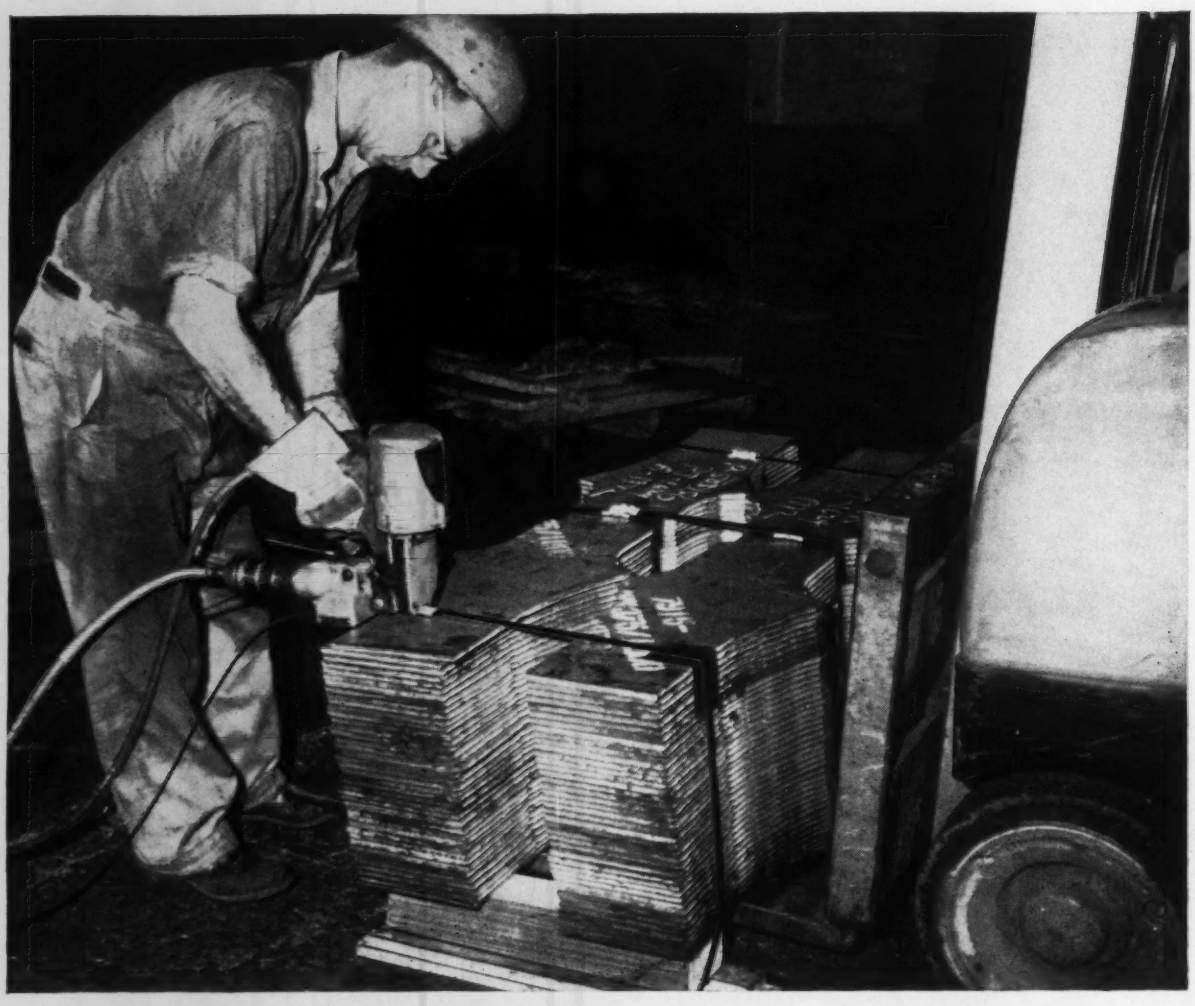

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